Racial Differences in Glycemic Control in a Well-Functioning Older Diabetic Population

Findings from the Health, Aging and Body Composition study

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OBJECTIVE — To evaluate racial differences and factors associated with worse glycemic control in well-functioning older individuals with type 2 diabetes. Our hypothesis was that glycemic control would be worse among black than white diabetic individuals but that this association would be explained by differences in severity of diabetes, health status, health care indicators, and social, psychological, or behavioral factors. We further hypothesized that the association of race with poorer glycemic control would be limited to those with lower education or lower income.

RESEARCH DESIGN AND METHODS — Cross-sectional analysis of 468 diabetic participants among a cohort of 3,075 nondisabled blacks and whites aged 70–79 years living in the community enrolled in the Health, Aging and Body Composition Study. Glycemic control was measured by the level of HbA1c.

RESULTS — A total of 58.5% of the diabetic individuals were black. Although control was poor in all diabetic participants (HbA1c ≥7% in 73.7%), blacks had worse glycemic control than whites (age- and sex-adjusted mean HbA1c, 8.4% in blacks and 7.4% in whites; P < 0.01). Race differences in glycemic control remained significant, even after adjusting for current insulin therapy, cardiovascular disease, higher total cholesterol, and not receiving a flu shot in the previous year, all of which were associated with higher HbA1c concentrations. Controlling for these factors reduced the association by 27%. Race remained an important factor in glycemic control, even when results were stratified by education or income.

CONCLUSIONS — HbA1c concentrations were higher in older black diabetic individuals. Differences in glycemic control by race were associated with disease severity, health status, and poorer quality of care, but these factors did not fully explain the higher HbA1c levels in older black diabetic individuals.


Type 2 diabetes is one of the most common chronic diseases of old age in the U.S. (1), affecting nearly 20% of the U.S. population aged ≥75 years (2). The prevalence of type 2 diabetes varies considerably by ethnic group and is higher among African Americans and Hispanics compared with Caucasians (2,3). Poor glycemic control frequently occurs in U.S. patients with type 2 diabetes, particularly in African Americans and Hispanics (4), and poor glycemic control contributes to increased mortality and complications in these minority groups (5–7). Few factors seem to explain racial differences in glycemic control (4,8). To date, few studies have focused on glycemic control in older individuals with type 2 diabetes (9,10), particularly on racial differences in glycemic control in old age.

We used baseline data from the Health, Aging and Body Composition (Health ABC) study focusing on the 468 known diabetic individuals in a population of 3,075 black and white men and women aged 70–79 years who were drawn from a sample of Medicare recipients. We hypothesized that poor glycemic control would be associated with black race but that the poor glycemic control disparity between blacks and whites would be explained by differences in severity of diabetes (age at diagnosis and type of treatment), health status (weight, prevalent diseases, lipid levels, and functional status), socioeconomic factors (level of education, family income, access to care, and indicators of quality of care), and social, psychological, or behavioral factors (social support and physical activity). We further hypothesized that the association of race with poorer glycemic control would be limited to those of lower socioeconomic status (SES), whereas blacks with less than a high school education or lower income would have as good control as whites. Glycemic control was assessed by level of HbA1c.

RESEARCH DESIGN AND METHODS — The Health ABC study is a population-based clinical research study of the relationship of body composition, weight-related health conditions, and physical function in a cohort of blacks and whites, aged 70–79 years, who at baseline reported no difficulty
walking one-quarter mile or up one flight of stairs without resting. Participants were identified from a random sample of white Medicare beneficiaries and all age-eligible black community residents in designated zip code areas surrounding the Pitts-
burgh, Pennsylvania, and Memphis, Ten-
nessee, field centers. Excluded from the Health ABC study cohort were 1) individ-
uals who reported difficulty walking one-
quarter mile, walking up 10 stairs without
resting, or performing basic activities of
daily living and those who reported using
a cane or other equipment to get around;
2) individuals with known life-threatening
cancers; and 3) individuals who planned
to leave the area within 3 years. All par-
ticipants gave written informed consent,
and all protocols were approved by the
Institutional Review Boards at both study
sites. The participants included 1,491
men and 1,584 women, 468 (15.2%) of
whom identified themselves as having di-
betes and/or using any hypoglycemic
medication at the time of their recruit-
ment into the study. A detailed interview
regarding social demographics, health be-
haviors, indicators of SES, and health ser-
vice utilization was administered in the
home. Participants also underwent a clin-
ical examination that included measure-
ment of HbA1c, fasting glucose, body
composition, indicators of weight-related
health conditions, and total, LDL, and
HDL cholesterol.

The baseline home interview and clinic-based examination were performed
between April 1997 and June 1998.

Assessment of diabetes
We used a combination of self-reported
diagnosis and/or medications to identify
individuals with diabetes.

Measure of glycemic control
The primary indicator of glycemic control
was level of HbA1c (Biorad Variant high-
performance liquid chromatography
[HPLC] assay.). This measure integrates
control over the prior 6–8 weeks. In clin-
ical practice, the goal for good control is
HbA1c <7% (11). Fasting glucose level
was also measured.

Severity of diabetes
Severity of diabetes was examined in two
ways. First, duration of diabetes was de-

fined as either ≤5 years, 6–15 years, or
>15 years; patients with duration of dia-
betes >15 years were defined as the ref-
ference group. Also, we characterized
current treatment as insulin, oral hypo-
glycemics, or no medication, with insulin
treatment indicating more severe disease.

Health status
Lack of glycemic control might relate to
poorer health status; therefore, we as-
essed diabetes-related illnesses, weight,
lipid levels, and functional status. We
used a combination of self-reported diagnos-
oses and/or medications to establish the
prevalence of cardiovascular disease
(heart disease or stroke).

For hypertension, we used self-
report, medications, and measured blood
pressure. Peripheral arterial disease was
identified by an ankle-arm blood pressure
ratio. Cognitive function was assessed by the
Teng Modified Mini-Mental State
Examination, and eyeground and urinary inconti-
nence symptoms were assessed by ques-
tionnaire. We examined weight and
standing height expressed as BMI (weight
in kilograms divided by height in meters
squared).

Total cholesterol, HDL cholesterol,
and triglyceride levels were measured on
a Vitros 950 analyzer (Johnson & John-
son), and LDL cholesterol level was calcu-
lated using the Friedewald equation.

To assess whether differences in func-
tional status would affect level of glycemic
control, we used a summary measure that
combines usual gait speed, gait speed
over a narrow walk course (20 cm), time
to complete five chair stands, and stand-
ing balance. The development and valida-
tion of this summary measure have been
described in detail elsewhere (12). The
measure ranges from 0 to 4; a higher score
indicates better function.

SES
The SES variables included education,
income, access to care, and indicators of
quality of health care. Education was con-
sidered in two groups: <12 years of
school and ≥12 years of school. We also
considered other SES indicators, includ-
ing family income of ≤$25,000 or
>$25,000. Income included wages, sala-
ries or retirement benefits, help from rel-
atives, rent from property, and any other
source of income in the year before the
interview.

Access and quality of care
Access to care and quality of care were
important to explore as potential explan-
atory variables. In cardiovascular care, in
particular, individuals of black race have
been associated with worse quality of care
(13). All participants were assumed to be
enrolled in Medicare, because this was the
sampling frame. Additional health insur-
ance status was defined in three levels: no
prescription coverage, no prescription
coverage but supplemental health insur-
ance through the federal government or a
private agency, or prescription coverage
with either Medicaid or supplemental
health insurance. Access to care was de-

fined as report of having a place to visit for
usual health care or health care advice,
including health maintenance organiza-
tions (HMOs) or private doctor’s offices.
Indicators of quality of care included re-
port of receiving a flu shot in the past 12
months and whether two of the following
cardiovascular risk factors were below
recommended levels: systolic blood pres-
sure (<140 mmHg), diastolic (<90
mmHg), or LDL cholesterol level <130
mg/dl.

Social, psychological, and behavioral
indicators
Social health was assessed by social sup-
port (i.e., the number of relatives or
friends who participants felt close to or
could call on for help). Psychological
health was assessed by a 20-item CES-D
scale (14), which is used to assess depres-
sive symptoms by self-rated health status.
We did not have direct indicators of self-
care related to diabetes; therefore, we
used other health practice indicators.
These included participation in regular
walking for exercise during the last 12
months as a positive indicator of self-care
and current smoking as a negative
indicator.

Statistical methods
Baseline descriptive characteristics of the
diabetic study population were compared
by sex and race using the χ2 test for di-

cotomous variables and generalized lin-
ear models for continuous variables. We
then assessed each of these characteristics
in relation to glycemic control using
HbA1c, as a continuous variable in a linear
regression model and retained those vari-
ables related to both race and glycemic
control (P ≤ 0.10) after controlling for
age, sex, BMI, duration of diabetes, and
study site. We then created a multivariate
analysis to test whether the effect of race
on glycemic control could be explained...
Racial differences in glycemic control

Table 1—Characteristics of the diabetic population in the Health ABC study

<table>
<thead>
<tr>
<th></th>
<th>Women (n = 218)</th>
<th>Men (n = 250)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Black</td>
<td>White</td>
</tr>
<tr>
<td>n</td>
<td>134 (21.1%)</td>
<td>64 (7.5%)</td>
</tr>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>73.4 ± 2.9</td>
<td>73.3 ± 3</td>
</tr>
<tr>
<td>Disease severity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at diagnosis (years)</td>
<td>60.2 ± 11.6</td>
<td>58.9 ± 13.6</td>
</tr>
<tr>
<td>Treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No medication</td>
<td>10.4%</td>
<td>31.3%</td>
</tr>
<tr>
<td>On insulin</td>
<td>31.8%</td>
<td>18.8%</td>
</tr>
<tr>
<td>On oral hypoglycemics</td>
<td>59.7%</td>
<td>53.1%</td>
</tr>
<tr>
<td>Fasting glucose (mg/dl)</td>
<td>157.3 ± 65.8</td>
<td>140.7 ± 43</td>
</tr>
<tr>
<td>HbA1c (%)</td>
<td>8.3 ± 1.8</td>
<td>7.3 ± 1.2</td>
</tr>
<tr>
<td>HbA1c ≥7%</td>
<td>77.9%</td>
<td>65.6%</td>
</tr>
<tr>
<td>Health status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>32.5%</td>
<td>35.9%</td>
</tr>
<tr>
<td>Systolic BP (mmHg)</td>
<td>139.2 ± 22.2</td>
<td>135.1 ± 15.1</td>
</tr>
<tr>
<td>Diastolic BP (mmHg)</td>
<td>68.5 ± 11.5</td>
<td>66.4 ± 10.2</td>
</tr>
<tr>
<td>Ankle arm index</td>
<td>0.97 ± 0.2</td>
<td>1.06 ± 0.2</td>
</tr>
<tr>
<td>Urinary incontinence symp</td>
<td>40.5%</td>
<td>65%</td>
</tr>
<tr>
<td>Mini-mental score (Teng)</td>
<td>84.7 ± 10</td>
<td>93 ± 5.9</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>31.1 ± 5.4</td>
<td>28.6 ± 5.7</td>
</tr>
<tr>
<td>Cholesterol (mg/dl)</td>
<td>210.9 ± 41.1</td>
<td>211 ± 43.5</td>
</tr>
<tr>
<td>HDL cholesterol (mg/dl)</td>
<td>57.7 ± 18.4</td>
<td>50.16 ± 12.5</td>
</tr>
<tr>
<td>Triglycerides (mg/dl)</td>
<td>132.7 ± 59.6</td>
<td>205.2 ± 120.5</td>
</tr>
<tr>
<td>Physical performance score</td>
<td>1.71 ± 0.6</td>
<td>2.0 ± 0.5</td>
</tr>
</tbody>
</table>

Data are means ± SD unless otherwise indicated. *P < 0.05, comparison between race in men; †P < 0.05, comparison between race in women; ‡P < 0.05, comparison between sex in whites; §P < 0.05, comparison between sex in blacks. NS, not significant at P < 0.05. BP, blood pressure.

RESULTS — Baseline characteristics of the diabetic population are shown in Table 1. Of the 468 diabetic participants in the Health ABC study cohort (15.2% of our cohort), 274 (58.5%) were black. From the whole cohort, blacks had a higher proportion of diabetic individuals than whites (21.4 vs. 10.8%, respectively). More men (35.5%) than women (28.6%) had diabetes, and the level of control among all diabetic individuals in the study was poor (73.7% with HbA1c ≥7%, regardless of race).

Among diabetic participants, 82.3% took either insulin or hypoglycemic agents; 25% of these individuals were on insulin. A total of 30% of the blacks were on insulin versus 17% of the whites. Duration of diabetes did not vary by race or sex. Although fasting glucose did not vary by race, HbA1c levels were higher in blacks (age- and sex-adjusted HbA1c 8.4% in blacks vs. 7.4% in whites). Ankle-臂 index levels were consistent; more peripheral artery disease was noted in both black men and women, although prevalence of cardiovascular disease was similar by race. HDL cholesterol levels were higher and triglyceride level were lower in diabetic blacks, whereas diastolic blood pressure was higher in black men. BMI was higher in blacks, particularly women. Blacks with diabetes scored more poorly on tests of cognitive function and physical function and reported worse health status.

For SES indicators (Table 2), blacks had lower education, lower family income, less additional health insurance, less access to care, and worse indicators of quality of care (having had a flu shot in women, and poorer diastolic blood pressure in men) than whites. The only differences by race for social, psychological, and behavioral indicators were that more black diabetic men walked for exercise and were more likely to be current smokers.

Correlates of glycemic control

Black race was consistently associated with worse glycemic control, regardless of type of treatment. Among people using insulin therapy, blacks had worse control than whites (mean HbA1c 8.6 and 7.8%, respectively, in models adjusted for age, sex, BMI, duration of diabetes, and study site; P < 0.05). Findings were similar among participants using oral hypoglycemic agents (adjusted mean HbA1c level 8.4% for blacks and 7.7% for whites; P < 0.01). Even among participants using no drug therapy, there was still a significant

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difference in levels of HbA1c between race (adjusted mean HbA1c level 8.1% for blacks and 6.6% for whites; \( P < 0.01 \)). In the multivariate models, race was no more associated with poorer control when only those on insulin therapy were examined.

Black race was associated with worse glycemic control than white race (Table 3), and adjustment for factors associated with poor control, including prevalent cardiovascular disease, higher total cholesterol level, greater BMI, poorer summary performance measure, and use of insulin therapy, did not change this. The results were not affected by addition of indicators of quality of care, level of education, or social support. In multivariate models, in addition to race (\( P < 0.001 \)), male sex (\( P < 0.001 \)), prevalent cardiovascular disease (\( P < 0.001 \)), higher total cholesterol (\( P < 0.01 \)), use of insulin therapy (\( P < 0.05 \)), and study site (\( P < 0.05 \)) still were associated with poorer control. One measure of quality of care, not receiving a flu shot, also was associated with higher HbA1c levels (\( P < 0.05 \)). Controlling for all these factors decreased the association between glycemic control and race by 27% (\( \beta \)-parameter 0.66, \( P < 0.0001 \)). Results were similar when using selected HbA1c cutpoints (data not shown).

SES, race, and glycemic control
To examine whether differences by race existed across the range of SES levels, we first examined the association of confounding variables with education level and with income level. Participants with <12 years of education were more frequently using insulin therapy and had poorer self-perceived health status. They also had a lower income, poorer quality of care (as indicated by not having a flu shot; \( P < 0.01 \)), and were less likely to have supplemental insurance or a usual place of care. However, there was no significant interaction found between race and education level or between race and income level, and race was associated with poorer glycemic control in both higher and lower education groups and in both higher and lower income groups. Among those with <12 years of education, black race was a significant correlate of glycemic control. Multivariate adjustment, including factors more likely to be associated with lower education, reduced differences in HbA1c by race. Although blacks continued to have higher HbA1c levels, this difference was no longer significant (Table 3). Among those with \( \geq 12 \) years of education, black race was associated with poor glycemic control, whatever the income level.

**CONCLUSIONS** — In our study population, black race was associated with poorer glycemic control, even when we restricted the study population to those with no high school education or more or greater family income. Previous studies have shown that blacks had worse control, but the study populations were younger (4,15) and access to medical care.

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**Table 2—SES, access, and quality of care indicators and other health status variables among the diabetic population**

<table>
<thead>
<tr>
<th></th>
<th>Women (( N = 218 ))</th>
<th>Men (( N = 250 ))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Black (( N = 154 ))</td>
<td>White (( N = 64 ))</td>
</tr>
<tr>
<td><strong>n</strong></td>
<td>154 (21.1%)</td>
<td>64 (7.5%)</td>
</tr>
<tr>
<td><strong>SES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;12 years</td>
<td>50.3%</td>
<td>7.8%</td>
</tr>
<tr>
<td>≥12 years</td>
<td>49.7%</td>
<td>92.2%</td>
</tr>
<tr>
<td><strong>Family income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤$25,000</td>
<td>86.2%</td>
<td>45.0%</td>
</tr>
<tr>
<td>&gt;$25,000</td>
<td>13.9%</td>
<td>55.0%</td>
</tr>
<tr>
<td><strong>Access and quality of care</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No prescription coverage</td>
<td>20.7%</td>
<td>0.0%</td>
</tr>
<tr>
<td>No prescription coverage but supplemental health insurance</td>
<td>14.7%</td>
<td>23.4%</td>
</tr>
<tr>
<td>Prescription coverage with either medicaid or supplemental health insurance</td>
<td>64.7%</td>
<td>76.6%</td>
</tr>
<tr>
<td><strong>Usual place of care is private doctor’s office or HMO</strong></td>
<td>77.3%</td>
<td>96.8%</td>
</tr>
<tr>
<td>Had flu shot in the past 12 months</td>
<td>62.1%</td>
<td>84.1%</td>
</tr>
<tr>
<td>Systolic BP &lt;140 (mmHg)</td>
<td>55.8%</td>
<td>64.1%</td>
</tr>
<tr>
<td>Diastolic BP &lt;90 (mmHg)</td>
<td>96.8%</td>
<td>100%</td>
</tr>
<tr>
<td>LDL cholesterol &lt;130 (mg/dl)</td>
<td>57.8%</td>
<td>57.8%</td>
</tr>
<tr>
<td><strong>Social, psychological, and behavioral</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social support from relatives</td>
<td>4.1 ± 3.3</td>
<td>5.1 ± 5.1</td>
</tr>
<tr>
<td>Social support from friends</td>
<td>2.6 ± 2.6</td>
<td>5.1 ± 6.1</td>
</tr>
<tr>
<td>Fair or poor self-rated health</td>
<td>37.3%</td>
<td>15.6%</td>
</tr>
<tr>
<td>Walking for exercise in previous 12 months</td>
<td>47.4%</td>
<td>56.3%</td>
</tr>
<tr>
<td>Current smokers</td>
<td>11.0</td>
<td>6.3</td>
</tr>
</tbody>
</table>

Data are n (%), means ± SD, and %. *\( P < 0.05 \), comparison between race in men; †\( P < 0.05 \), comparison between race in women; ‡\( P < 0.05 \), comparison between sex in whites; §\( P < 0.05 \), comparison between sex in blacks. NS, nonsignificant. BP, blood pressure.
Racial differences in glycemic control

Table 3—Multivariate and stratified analyses for glycemic control by race

<table>
<thead>
<tr>
<th></th>
<th>β-Coefficient for race</th>
<th>HbA1c</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>White</td>
</tr>
<tr>
<td>All diabetic participants (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1: Race</td>
<td>0.91</td>
<td>194†</td>
</tr>
<tr>
<td>2: + Age, sex, insulin therapy, duration of diabetes, and site</td>
<td>0.88</td>
<td>7.47</td>
</tr>
<tr>
<td>3: + BMI, cardiovascular disease, total cholesterol</td>
<td>0.87</td>
<td>7.49</td>
</tr>
<tr>
<td>4: + Education, social support</td>
<td>0.72</td>
<td>7.59</td>
</tr>
<tr>
<td>5: + Having a flu shot, physical performance score</td>
<td>0.66</td>
<td>7.61</td>
</tr>
<tr>
<td>SES stratified analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education ≥12 years (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1: Race</td>
<td>0.75</td>
<td>166</td>
</tr>
<tr>
<td>2: + Age, sex, insulin therapy, duration of diabetes, and site</td>
<td>0.68</td>
<td>7.45</td>
</tr>
<tr>
<td>3: + BMI, cardiovascular disease, total cholesterol</td>
<td>0.69</td>
<td>7.49</td>
</tr>
<tr>
<td>4: + Social support</td>
<td>0.68</td>
<td>7.49</td>
</tr>
<tr>
<td>5: + Having a flu shot, physical performance score</td>
<td>0.66</td>
<td>7.52</td>
</tr>
<tr>
<td>Education &lt;12 years (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1: Race</td>
<td>0.95</td>
<td>28</td>
</tr>
<tr>
<td>2: + Age, sex, insulin therapy, duration of diabetes, and site</td>
<td>0.87</td>
<td>7.59</td>
</tr>
<tr>
<td>3: + BMI, cardiovascular disease, total cholesterol</td>
<td>0.83</td>
<td>7.66</td>
</tr>
<tr>
<td>4: + Social support</td>
<td>0.80</td>
<td>7.69</td>
</tr>
<tr>
<td>5: + Having a flu shot, physical performance score</td>
<td>0.69</td>
<td>7.71</td>
</tr>
</tbody>
</table>

Income stratified

<table>
<thead>
<tr>
<th>Income ≥$25,000 (n)</th>
<th>β-Coefficient for race</th>
<th>HbA1c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income ≥$25,000 (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1: Race</td>
<td>1.05</td>
<td>106</td>
</tr>
<tr>
<td>2: + Age, sex, insulin therapy, duration of diabetes, and site</td>
<td>0.94</td>
<td>7.43</td>
</tr>
<tr>
<td>3: + BMI, cardiovascular disease, total cholesterol</td>
<td>0.97</td>
<td>7.47</td>
</tr>
<tr>
<td>4: + Education, social support</td>
<td>0.93</td>
<td>7.46</td>
</tr>
<tr>
<td>5: + Having a flu shot, physical performance score</td>
<td>0.87</td>
<td>7.50</td>
</tr>
</tbody>
</table>

Income ≤$25,000 (n)

<table>
<thead>
<tr>
<th>Income ≤$25,000 (n)</th>
<th>β-Coefficient for race</th>
<th>HbA1c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income ≤$25,000 (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1: Race</td>
<td>0.82</td>
<td>70</td>
</tr>
<tr>
<td>2: + Age, sex, insulin therapy, duration of diabetes, and site</td>
<td>0.81</td>
<td>7.52</td>
</tr>
<tr>
<td>3: + BMI, cardiovascular disease, total cholesterol</td>
<td>0.85</td>
<td>7.52</td>
</tr>
<tr>
<td>4: + Education, social support</td>
<td>0.68</td>
<td>7.50</td>
</tr>
<tr>
<td>5: + Having a flu shot, physical performance score</td>
<td>0.62</td>
<td>7.62</td>
</tr>
</tbody>
</table>

*β-Coefficient for race in the association with HbA1c level; †P < 0.05; ‡P < 0.01; §for income variable, 48 values were missing.

could not be adequately controlled for. In an older population, all Medicare-eligible individuals, the issue of access to care should be minimized as a factor contributing to potential differences in glycemic control by race. Shorr et al. (9) examined data from the National Health and Nutrition Examination Study III and found that many older adults with type 2 diabetes did not achieve targets for glycemic control, but there was no evidence that these community-dwelling diabetic elderly individuals were less well controlled and treated less vigorously than younger diabetic individuals. However, blacks of all ages were approximately twofold more likely to have poorer glycemic control than whites with few differences (4,9). There were relatively few blacks >70 years of age in that study, which limited the possibility of exploring explanatory relationships in old age specifically.

We examined several factors that might explain the relationship observed between race and glycemic control. One such factor is the severity of diabetes. Duration of diabetes was similar in whites and blacks and was not associated with poorer control, as found in other studies (8,15). Blacks could have been diagnosed later than they reported, but a recent analysis on undiagnosed diabetes in the Health ABC study showed that race was not significantly associated with undiagnosed diabetes (16). Blacks were more likely to be taking insulin, as has been found in other studies (4,15,17). Whether this difference in therapy reflects poorer disease course or an earlier failure rate on other medications is unclear. Insulin therapy was still associated with poorer control in multivariate models, but controlling for current medication type did not explain the racial difference. In other studies, insulin treatment in general is associated with poorer control (15,17), but physician reasons for switching patients to insulin therapy have not been systematically assessed.

A second factor was quality of care received by the diabetic population. We included three direct and indirect indicators of adequate medical care: control of cholesterol, control of blood pressure, and reporting of a flu shot in the past year. Of these, flu shot administration is best established as an indicator of care. Sub-
stantial disparities have been reported in studies of black and white patients (18) for a variety of medical treatments, including vaccination for flu in managed care. In a diabetic Medicare population aged 65 years and older, Chin et al. (19) found that black patients who had <12 years of education had fewer measurements of HbA1c and fewer influenza vaccinations. In our study, receiving a flu shot was independently associated with better glycemic control, independent of race.

A third factor may be level of self-care. We did not have direct measures of self-care for diabetes, but we used two surrogate measures of self-care: participation in a physical activity or current smoking. These indirect measures of self-care also did not influence glycemic control. We had no data on patient education or self-monitoring of blood glucose on glycemic control; there is evidence that this may influence the level of glycemic control. Several studies have shown that an education program can lead to improvement of glycemic control, even in older people (20–23). Cowie et al. (24) found that the median number of hours of instruction was lower for blacks, and this may provide some insight into worse glycemic control in that population. Self-monitoring of blood glucose among insulin-treated patients is lower in blacks in the National Health and Nutrition Examination Study III (17). Clinical research (25) also suggests that nurse care managers may be an important factor in differences in level of control because they contribute to adherence to diet, weight loss, prescribed medication intake, and self-monitoring of blood glucose. Another aspect of self-care that might have influenced glycemic control is drug adherence; one study (26) demonstrated a strong association between poorer adherence to diabetes drug therapy and worse metabolic control in blacks compared with whites. We did not have data on adherence but coverage for drug benefits and family income did not predict control.

Few studies have had adequate power to address effects of SES on control of diabetes in older people. It was surprising that the association of race with glycemic control was present, even among those with higher educational levels or higher income, despite controlling for factors hypothesized to explain the association. The association among the lower education group was of borderline significance after adjustment, probably reflecting the small number of whites in the lower education diabetic group. That SES stratification did not resolve the association of race, and higher HbA1c levels may suggest a stronger role for adequacy of care, consistent with data on other health conditions and race.

Given priorities to study health disparities, racial differences in glycemic control should be further studied to identify factors amenable to intervention. Efforts in this direction are likely to benefit all older individuals with diabetes.

Acknowledgments — This study was supported by Contracts NO1-AG-6-2101, NO1-AG-6-2103, and NO1-AG-6-2106 of National Institute on Aging.

References


Racial differences in glycemic control