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Ethnic differences in acetylcholinesterase inhibitor use for Alzheimer disease

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Abstract

Acetylcholinesterase inhibitors (AChIs) have been demonstrated to improve Alzheimer disease symptoms. Whether the use of AChIs varies by ethnicity is unknown. More than 2500 ethnically diverse patients (6% African American, 14% Latino, and 7% Asian patients) from the Alzheimer's Disease Research Centers in California were studied. Compared with white patients with AD, minority patients had 40% lower odds of AChI use (odds ratio 0.6, 95% confidence interval: 0.5 to 0.7).

Minority elders in the United States have higher rates of dementia compared with white elders.¹ As the minority older adult population is growing, there are more than three million expected dementia cases in minority adults by 2050 in the United States.²

Clinical practice guidelines^{3,4} suggest the use of acetylcholinesterase inhibitors (AChIs) to delay the progression of Alzheimer disease (AD). Because previous studies suggest ethnic gaps in medication use for conditions such as depression, diabetes, and hypertension,⁵ we sought to determine whether AChIs are used less often in minority groups compared with white patients with AD. Secondly, we examined the extent to which potential covariates help explain any noted differences in AChI use.

Methods

Subjects

New patients were seen from 1999 to 2003 at one of the 10 university-affiliated Alzheimer's Disease Research Centers of California (ARCCs). This study was approved by the Institutional Review Board at the University of California, San Francisco.

Measures

Patients were assessed regarding demographics, medical history, and presenting symptoms using the state-developed Minimum Uniform Dataset (MUDS)⁶ collection form. Each patient's cognitive and functional status was measured using standardized instruments. Using these data in combination with medical history and physical examination findings, a neurologist and multidisciplinary team determined whether patients fulfilled National Institute of Neurologic Disorders and Stroke–Alzheimer's Disease and Related Disorders Association criteria for probable or possible AD.⁷ Ethnicity was defined using US Census 2000 definitions.⁸ Ethnicity

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was evaluated by comparing all patients of any minority ethnicity with white patients and separately for African-American, Latino, and Asian patients compared with white patients.

AChI medications

At the time of the interview, current and past use of three AChIs (donepezil, rivastigmine, and galantamine) was recorded. No patients were taking either memantine or tacrine during the study period.

Statistical analyses

Bivariate associations between potential covariates and AChI use were tested with χ^2 tests for categorical and with t tests for continuous factors. The variance in AChI use was calculated using analyses of variance by ethnicity (African American, Latino, Asian, and white). Stratified analyses were conducted to evaluate whether there were any trends in AChI use over the study period. Subanalyses evaluated only current use of these medications, duration of use, and reasons for stopping use of AChIs.

Logistic regression modeling was used to examine the overall association of minority ethnicity on AChI use in two models: 1) any minority ethnicity compared with white and 2) evaluating each ethnic group separately compared with whites. To evaluate potential covariates of the association, a third multivariate model was built. Potential covariates that were statistically significantly associated with AChI use on bivariate testing ($\alpha = 0.10$ and 0.01) were added simultaneously to this multivariate model. The efficiency of all models was evaluated using Hosmer-Lemeshow goodness-of-fit statistics.

Results

The 2,573 patients with AD were on average 78.1 ± 8.4 years of age and had 12.8 ± 4.2 years of education, and 65% were women. The patients were ethnically diverse with 6% African American, 7% Asian, 14% Latino, 2% of other ethnicity, and 71% white. Minority patients with AD were similar in age to white patients but differed from white patients on several other characteristics (tables 1 and 2).

A smaller proportion of minority patients with AD reported that they had any past or current use of AChIs compared with white patients (African Americans [32%], Asians [35%], Latinos [34%] as compared with white patients [49%] ($p < 0.001$ for all). A smaller proportion of minority patients (25% African American, 26% Asian, 26% Latino) reported current use compared with white patients (37%) ($p < 0.001$). When results were evaluated separately for each year from 1999 to 2003, no time trends were noted. White patients and minority patients reported similar duration of use ($p = 0.47$). A subset of patients with AD reported reasons for stopping AChIs: 3% of minority patients stopped taking AChIs because they felt that the medication did not help compared with 6% of white patients ($p < 0.001$).

In an unadjusted model, minority ethnicity was associated with 40% lower odds of AChI use (odds ratio [OR] 0.6; 95% CI: 0.5 to 0.7). After simultaneous adjustment for covariates associated with AChI use on bivariate testing, minority patients were nearly 25% less likely to report no AChI use compared with white patients (OR 0.77; 95% CI: 0.7 to 0.9). This model had an adequate Hosmer-Lemeshow goodness of fit ($p = 0.78$). Findings were similar when each minority group was evaluated separately.

Covariates that were independently associated with AChI use were younger age, higher education, having Medicare A/B, not having MediCal, other health insurance, hypertension, a lower Mini-Mental State Examination (MMSE) score (<12), and more functional disability (Blessed-Roth Dementia Rating Scale [BRDRS] score ≥ 5.5) (table 3).

Discussion

This study explored ethnic differences in AChI use among patients with AD at 10 university-affiliated memory disorders clinics in California. Our data indicate that minority patients with AD have lower rates of AChI use than white patients, even after adjusting for covariates such as demographics, health insurance status, comorbid diseases, and severity of disease.

Previous research suggests that minority older adults without AD have increased rates of cognitive impairment and higher rates of dementia compared with white older adults.^{1,9} In addition, minority patients with AD may have increased neuropsychiatric symptoms.¹⁰ Our data extend this work by describing ethnic differences in AChI use.

Identified covariates of AChI use were having Medicare part A or B, not having MediCal, having lower MMSE scores, and having more functional disability. Because patients with AD without MediCal and those with Medicare parts A and B have higher incomes, they possibly have a better ability to pay out of pocket or may have other insurance that covers costs, potentially explaining this disparity. Considering the strong link between disease severity and AChI use, we hypothesized that controlling for mental status and functional disability might reduce the differences seen by ethnicity; however, our results confirmed that a racial disparity still existed after controlling for several risk factors, suggesting a true lower rate of use for these minority patients.

For other common conditions in older adults, namely osteoporosis, diabetes, hypertension, and heart disease, studies have shown disparities in medication use for minority patients. Possible explanations for these differences include differential clinician prescribing patterns by ethnicity, differences in patient preferences, or perhaps, differences in the number of medical visits to specialists by ethnicity.

In evaluating our results, we note some considerations. First, the clinic sites are predominantly urban, academically affiliated hospitals. This may make our results less generalizable to patients with AD seen by primary care physicians or in the community. Although neurologists evaluated patients at the memory disorders clinics, we do not have information about neurologist care before ARCCs, nor can we discern whether neurologist care is associated with noted differences in AChI use. We evaluated some key aspects of risk including insurance, comorbidities, and disease severity; however, we had no information on the participants' income, poverty index, household income/household number, or out-of-pocket expenses. We used MediCal status as a method for controlling for access to insurance and low income, but this does not adequately account for ethnic differences that may still be present within the MediCal population.

As our study suggests a gap in medication use for minority patients with AD, and AD is both a devastating and expensive disease, further work is needed to identify whether our results are a marker of less treatment or management of AD in ethnic minority patients with AD. For example, it would be interesting to note whether the pattern of lower use of AChIs confirmed by lower use of imaging or other diagnostic or treatment services (e.g., absence of a primary care physician) for minority patients with AD. An appropriate next step would be to identify the reasons for the gap, including differential clinician prescribing patterns, patient preferences, and differences in specialty care for minority groups.

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Table 1
Characteristics of patients with Alzheimer disease seen at 10 Alzheimer's Disease Research Centers of California by ethnicity (1999–2003) (n = 2,573)*

Characteristic [†]	All	White	African American	Asian	Latino	p Value [‡]
Age, y	78.1 (8.4)	78.3 (8.1)	77.6 (8.3)	78.5 (8.0)	76.9 (9.7)	0.01
Education, y	12.8 (4.2)	13.8 (3.1)	11.4 (3.6)	12.5 (4.8)	7.8 (5.1)	<0.001
Female	65	63	80	74	69	<0.001
Caregiver						
Spouse	40	43	19	36	30	0.16
Child/other	60	57	81	64	70	
Living arrangement						
Alone	19	20	17	17	13	<0.001
Spouse	48	51	23	45	41	
In a household	25	18	53	33	41	
In a facility/group	9	11	7	5	4	
Medicare/insurance						
Medicare part A/B	75	80	72	53	65	<0.001
MediCal	14	5	29	29	43	<0.001
Other insurance	65	75	44	55	31	<0.001
No insurance	2	1	2	5	7	<0.001
History of						
Hypertension	46	44	59	46	51	0.002
Heart disease	24	26	17	15	20	0.002
Diabetes	11	9	18	17	20	<0.001
Stroke/TIA	9	9	9	7	9	0.47
Hyperlipidemia	27	28	22	26	21	0.05
Alcohol abuse	9	9	10	2	10	0.006
MMSE score	18.1 (6.8)	19.1 (6.4)	15.7 (6.8)	15.6 (6.6)	15.1 (7.2)	<0.001
>19	49	55	30	36	32	<0.001
12–19	33	31	44	36	38	
<12	18	13	26	29	31	

Characteristic [‡]	All	White	African American	Asian	Latino	p Value [‡]
BRDRS score	4.8 (3.3)	4.5 (3.1)	6.3 (3.9)	5.3 (3.3)	5.8 (3.8)	<0.001

* 2% (n = 63) patients with Alzheimer disease of other ethnicity excluded from this table.

[‡] Percentage or mean (SD).

[‡] p values determined by analysis of variance for each characteristic by ethnicity.

MMSE = Mini-Mental State Examination; BRDRS = Blessed-Roth Dementia Rating Scale.

Table 2
Current or past use of acetylcholinesterase inhibitors reported by patients with Alzheimer disease seen at 10 Alzheimer's Disease Research Centers of California by ethnicity* (1999–2003) (n = 2,573)

Acetylcholinesterase inhibitor use, %	White, n = 1,879	African American, n = 144	Asian, n = 194	Latino, n = 361	p Value
Any past or current use	49	32	35	34	<0.001
Any current use	37	25	26	26	<0.001
Current donepezil use	32	19	22	22	<0.001
Current galantamine or rivastigmine use	5	6	4	4	<0.001

* Two percent (n = 63) of patients with AD of other ethnicity excluded from this table.

Table 3
Multivariate odds of past or current acetylcholinesterase inhibitor use among the 2,546 patients with Alzheimer disease*

Characteristic	Odds ratio	95% CI
African American	0.6	0.4–0.9
Latino	0.9	0.7–1.1
Asian	0.7	0.5–1.0
Other	0.5	0.3–0.9
White	1.0 (ref)	
Age per 5 y	0.9	0.8–0.9
Education per 5 y	1.1	1.0–1.3
Female	0.9	0.7–1.1
Lives alone	0.8	0.6–1.1
Lives in a household	0.8	0.6–1.0
Lives in a health facility/group setting	1.00	0.7–1.4
Lives with Spouse	1.0 (ref)	
Spouse caregiver	1.4	1.0–1.8
Child/other caregiver	1.0 (ref)	
Medicare part A or B	1.4	1.1–1.8
MediCal	0.6	0.4–0.8
Other health insurance	1.3	1.1–1.6
No health insurance	0.5	0.3–1.0
Hypertension	1.3	1.1–1.5
Diabetes	1.0	0.8–1.4
MMSE score		
<12	1.4	1.1–1.8
12–19	1.2	1.0–1.5
>19	1.0 (ref)	
BRDRS score		
>5.5	1.7	1.3–2.3
2.5–5.5	1.2	1.0–1.6
<2.5	1.0 (ref)	

* Data on covariates missing for 27 patients.

MMSE = Mini-Mental State Examination; BRDRS = Blessed-Roth Dementia Rating Scale.