RACIAL DIFFERENCES IN ANALGESIC/ANTI-INFLAMMATORY MEDICATION ADHERENCE Among Patients with Osteoarthritis

Objectives: This study examined the prevalence of self-reported adherence to medications for osteoarthritis (OA) and racial differences in adherence.

Methods: This was a cross-sectional survey of 156 Black and White veterans who were taking medications for OA.

Results: One quarter of participants reported sometimes forgetting to take their OA medications, 16% were sometimes careless about taking medications, and 27% sometimes stopped taking their medications when they felt better. Overall, 44% of participants reported at least one of these three behaviors. In a multivariable logistic regression model adjusting for demographic factors, OA severity, participatory decision making (PDM), and side effects, Black patients were more likely to report at least one nonadherent behavior (odds ratio [OR]=2.25, 95% CI=1.03-4.91). Patients with greater PDM scores were slightly less likely to report nonadherent behavior (OR=0.95, 95% CI=0.91-0.99).

Discussion: Additional research is needed to examine factors underlying racial differences in adherence, to guide effective interventions. (*Ethn Dis*.2004;15:116–122)

Key Words: Analgesics, Ethnic Groups, Nonsteroidal Antiinflammatory Drugs, Osteoarthritis, Patient Nonadherence

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INTRODUCTION

Osteoarthritis (OA) is one of the most common chronic conditions in the United States, and a leading cause of disability among older adults.¹⁻³ Because of the rapidly growing number of older adults in the United States, the prevalence of OA is expected to increase dramatically over the next two decades.4,5 Pharmacologic therapy is a key component of treatment for OA. Specific medications used to treat OA symptoms include acetaminophen, traditional nonsteroidal anti-inflammatory drugs (NSAIDs), cyclooxygenase-2 (COX-2) inhibitors, and opioid analgesics. Early discontinuation is common with analgesic/anti-inflammatory drugs6,7; however, little is known about how well patients with OA adhere to their medication regimens.

Some studies have focused on medication adherence in rheumatoid arthritis (RA).8,9 However, RA and OA differ in their symptoms, treatment, and responses to pharmacologic therapies.10 One study indicated that medication adherence is lower in patients with OA compared to RA; only 54% of patients with OA and 73% of patients with RA adhered to prescribed medications.11 However, this study was conducted before the availability of newer NSAIDs, including COX-2 inhibitors, which may be associated with fewer GI side effects. Further research is needed to examine the prevalence of medication nonadherence among patients with OA and factors that predict nonadherent behaviors.

One factor that has been related to medication adherence in previous studies is race.^{12,13} In one recent study, Black patients were less likely than Whites to refill medications for diabetes, hyperten-

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> sion, and hypercholesterolemia.¹² Our prior research has also indicated that Black patients discontinue use of analgesic and anti-inflammatory medications sooner than White patients.¹⁴ We were particularly interested in examining whether Black and White patients differed in reports of nonadherent behaviors related to OA medications. The Veteran Affairs (VA) healthcare system, the setting of this study, is an equal-access system in which medication co-payments are nominal and equal for all drugs. Therefore, the VA setting provides an opportunity to examine racial differences in a healthcare setting where economic and access-to-care issues are minimized. This opportunity is particularly relevant for the present study, since medication costs can affect patients' adherence.

> We examined self-reported adherence to analgesic and anti-inflammatory medications among patients with OA. Specific objectives of this study were to: 1) describe the frequency of self-reported nonadherent behaviors; 2) examine whether self-reported adherence differs between Black and White veterans; and 3) examine racial differences when controlling for other factors that may influence medication adherence, including demographic characteristics, arthritis severity, side effects, and participatory decision-making.

Methods

Study Sample

Participants were patients of the Durham VA Medical Center. Potential participants were initially identified on the basis of an International Classification of Diseases, ninth revision (ICD-9) ... little is known about how well patients with OA adhere to their medication regimens.

code indicating OA (715), by using VA electronic medical records. We also identified individuals with an upcoming clinic appointment, so that the in-person survey could be conducted in conjunction with a regularly scheduled clinic visit. This was done because many VA patients travel long distances for their clinic appointments. Patients were recruited by telephone before their clinic visit. Among 359 veterans who were contacted, 32 indicated they did not have osteoarthritis, and 29 stated their upcoming VA appointment had been cancelled or rescheduled. Of the remaining 298 eligible patients, 25 refused participation, and 68 agreed to participate but did not show up for the interview. Of the 205 veterans who completed the survey, 49 were not taking medications to treat their OA and were excluded from analyses. The remaining sample was 156.

Measures

Participants were asked to complete a survey including questions about arthritis symptoms and treatments. The dependent variable for this study was medication adherence. We used a revised version of the medication adherence questions developed and validated by Morisky et al.¹⁵ The original questionnaire contained four questions about general medication adherence. We revised this questionnaire to ask specifically about arthritis medications. In addition, we omitted the fourth question ("Sometimes if I feel worse when I take my arthritis medicine, I stop taking it.") on the original scale because its meaning is unclear regarding adherence to OA medications. In the context of medications for OA, "feel worse" may mean that patients are experiencing GI side effects (rather than worsening OA symptoms). Since GI symptoms may indicate bleeding, a risk of NSAID use, discontinuing medication use may be appropriate for patients with GI side effects. The three items included in our revised measure were as follows:

- I sometimes forget to take my arthritis medicine.
- I am sometimes careless about taking my arthritis medicine.
- When I feel better, I sometimes stop taking my arthritis medicine.

All questions were asked with reference to current OA medication use. Participants were asked to indicate whether they strongly agreed, agreed, disagreed, or strongly disagreed with each of the three statements. For our analyses, we combined these responses into two categories, agree vs disagree, to facilitate interpretation and analysis. We also created two composite adherence items. The first composite item indicated whether participants agreed with any of the three questions. The second composite item indicated whether participants agreed with either of the first two questions. We created this second measure because arthritis drugs are sometimes prescribed on an as-needed basis. In these cases, it is appropriate for patients to stop taking medications when they feel better (ie, are not having substantial pain). Therefore a positive response to the third item would not necessarily be considered a nonadherent behavior.

Our analyses focused on racial differences in medication adherence, and the study sample included only Black and White participants. Other covariates included were age, sex, marital status, education, arthritis severity, participatory decision making (PDM), and side effects from current arthritis medication(s). All variables were self-reported. We compared individuals who were married or living with a partner as married with those who were single, separated, divorced, or widowed. With respect to education level, we compared those with some college education or more to those who did not attend college. Arthritis severity was measured using the Western Ontario McMaster Universities Osteoarthritis Index (WOMAC), a validated and reliable scale designed to assess pain and function in OA.16,17 Scores on this item range from 0 (no pain or disability) to 96 (extreme pain or disability). Participatory decision making was examined because OA is a chronic disease, requiring interaction between the healthcare provider and patient to determine optimal treatment strategies over time. We examined participatory decision making using a validated three-item scale.18,19 These items ask participants to rate, on a 10-point scale, how likely their physicians are to: 1) involve them in treatment decisions; 2) give them a sense of control over their medical care; and 3) take some responsibility for their care. Side effects were assessed by asking participants whether they were experiencing any symptoms they believed may have been caused by their arthritis medication(s).

Statistical Analyses

We used chi-square analyses to compare demographic, disease-related, and medication-related characteristics of Black and White patients. We then examined bivariate relationships of race and other covariates with the binary medication adherence variables by using chi-square tests and t tests. A multivariable logistic regression model simultaneously examined relationships of each of the covariates to a composite adherence measure. Finally, we were interested in comparing the relationships of our covariates to medication adherence among Black and White patients. We first examined the bivariate relationships of age, marital status, education, arthritis severity, PDM, and side effects with adherence in Blacks and Whites separately. Because of the small number of females, we did not examine the relationship of sex with medication adherence in the separate racial groups. Our sample size did not permit us to conduct separate multivariable analyses for each racial group that included all of our covariates. We therefore restricted these separate multivariable models to include only variables that had significant (P<.05) relationships to adherence among either Black or White patients. All statistical analyses were performed by using SAS PC, Version 8 (SAS Inc., Cary, NC).

Results

Our final study sample consisted of 156 Black (35%) and White (65%) veterans with OA who were taking analgesic or anti-inflammatory medications to treat arthritis symptoms. The sample was primarily male (90%), the mean age was 63 years (standard deviation [SD]=11), 65% were married, and 56% had some college education. Disease severity in this sample was fairly high. The average WOMAC score was 52, and individuals with a WOMAC score \geq 39 are candidates for joint replacement surgery. The mean PDM score was 20, on a scale of 0-30. This score reflects an average of approximately 7 out of 10 for each of three scale items, with 0 reflecting the physician being never/very unlikely to involve the patient in treatment decision-making and 10 reflecting the physician being always/very likely to involve the patient. Twenty-six percent of patients reported having some side effect they believed was related to their OA medication(s). Most side effects reported by patients were GI symptoms (common with NSAID use) or sleepiness/drowsiness (common with opioid analgesic use). Black patients were significantly younger than White patients in this sample (Black=58 years (SD=13), White=64 years, P=.004), were less likely to

	Total Sample N (%)	Black N (%)	White N (%)	P value
Sometimes forget to take medications	39 (25)	17 (31)	22 (22)	.249
Sometimes careless about taking medications	24 (16)	11 (20)	13 (13)	.272
Sometimes stop taking medications				
when I feel better	41 (27)	17 (31)	24 (24)	.353
Three-item composite adherence				
measure*	67 (44)	29 (53)	40 (40)	.115
Two-item composite adherence				
measure†	47 (30)	21 (38)	26 (26)	.106
* Positive response to one of the three items.				

Table 1. Adherence items according to race

be male (Black=82%, White=95%, P=.007), and were less likely to be married (Black=52%, White=71%, P=.018). No significant racial differences were found in education level, arthritis severity, participatory decision making, or reports of side effects.

One quarter of participants indicated they sometimes forgot to take their arthritis medications, 16% said they were sometimes careless about taking their arthritis medications, and 27% said they sometimes stop taking their arthritis medications when they feel better (Table 1). Overall, 44% of participants agreed with one of the three items, and 30% agreed with one of the first two items (forgetting to take medications and being careless about taking medications). No significant racial differences were found in any of the individual adherence items or either of the composite measures (Table 1). However, greater proportions of Black participants agreed with each of the items.

In bivariate analyses, no variables had significant associations with either of the composite items (Table 2). The nonadherent group tended to have a greater proportion of Blacks, be younger, have lower PDM scores, and have a greater proportion of patients reporting side effects. In the multivariable logistic regression model for the three-item composite measure (Table 3), Black participants were significantly more likely to report nonadherent behavior than Whites (adjusted odds ratio [OR]=2.25, P=.042). In addition, individuals with greater PDM scores were less likely to report nonadherence (adjusted OR=0.95, P=.039). Because the distribution of the two-item composite measure resulted in small sample sizes in some categories of the independent variables, we did not conduct a multivariable analysis predicting this measure.

Table 4 presents bivariate relationships of age, marital status, education, arthritis severity, participatory decision making, and side effects to adherence among Black and White patients separately. Among Blacks, nonadherent individuals had a significantly lower disease severity than those who did not report nonadherent behavior (P=.014). Among White patients, nonadherence was significantly associated with younger age and self-report of medication side effects (P < .05). We conducted multivariable logistic regression models predicting non-adherence for Black and White patients separately. These models included age, arthritis severity, and medication side effects, since these variables had significant bivariate relationships with non-adherence among Black or White patients. Among White participants, none of these variables had significant relationships to self-report of nonadherence in the multivariable model (adjusted ORs: age OR=0.96, P=.092; arthritis severity OR=1.0, *P*=.842; side effect OR=2.35, *P*=.081;

	Three-Item Composite Measure*			Two-Item Composite Measure†		
	Adherent	Nonadherent	P value‡	Adherent	Nonadherent	P value‡
White race (%)	70	58	.115	69	55	.106
Mean age (SD)	64 (11)	60 (12)	.081	63 (11)	60 (11)	.178
Male (%)	93	87	.173	90	91	.759
Married (%)	63	68	.464	62	70	.309
Some college education (%)	54	55	.937	56	55	.941
Arthritis severity (mean WOMAC score						
[SD])	54 (17)	51 (15)	.196	52 (16)	53 (16)	.882
Participatory decision-making score						
(mean [SD])	21 (8)	19 (8)	.070	21 (8)	19 (8)	.184
Medication side effects (%)	21	33	.083	22	34	.115

* Positive response to one of the three items.

+ Positive response to one of the first two items.

‡ Results of *t* test for continuous variables and chi-square tests for categorical variables.

model c-statistic=0.66). Among Black patients, greater arthritis severity was associated with reduced odds of nonadherence (adjusted OR=0.96, P=.014), but no significant relationships with age (adjusted OR=1.01, P=.206) or side effects (adjusted OR=1.97, P=.317; model c-statistic=0.69) were seen.

DISCUSSION

This study examined adherence to analgesic and anti-inflammatory medications among a group of Black and White veterans with OA. Overall, nonadherence was high in this sample; 44% of participants reported at least one nonadherent behavior related to OA medications. These results are similar to those from a previous study among patients with OA, which reported that 46% of patients were nonadherent.11 In general, rates of nonadherence in various outpatient populations are approximately 40%-65%.20,21 With respect to specific behaviors, 25% of patients reported that they sometimes forgot to take medications, 16% were careless about taking medications, and 27% stopped taking medications when they felt better. The latter question may not be regarded as a nonadherent behavior when medications are prescribed on an as-needed basis. However, forgetting to take analgesic/anti-inflammatory drugs regularly or being careless about taking these drugs may result in less control of OA pain and symptoms, and greater OA-related pain may reduce physical function and quality of life.22,23

Table 3. Results of multivariable logistic regression model predicting medication nonadherence*

	OR	95% CI	P value
Black race	2.25	1.03-4.91	.042
Age	0.81	0.95-1.02	.272
Male	0.62	0.16-2.40	.484
Married	2.18	0.97-4.93	.061
Some college education	0.94	0.43-2.02	.866
Arthritis severity	0.98	0.96-1.00	.091
Participatory decision making score	0.95	0.91-0.99	.039
Medication side effects	1.78	0.76-4.02	.187

Note: C-statistic for model=0.69.

* Defined as a positive response to one of three questions assessing nonadherent behaviors.

Compared to White patients in this sample, greater proportions of Black patients reported each specific nonadherent behavior (as well as both composite measures), though these differences did not reach significance in bivariate analyses. However, Black patients had significantly greater odds of overall nonadherence (as measured by the three-item composite variable) in a model including other demographic factors, disease severity, participatory decision making, and medication side effects. This analvsis shows that when adjusting for patient characteristics that may be related to race or adherence, race is an important predictor of self-reported nonadherent behavior. Previous research has shown that Black patients are less adherent to medications for asymptomatic conditions.^{12,13} This study extends our knowledge of racial differences in adherence and suggests that Blacks are also less adherent to medications used to treat pain.

In previous studies, Black patients reported less participatory decision making and greater mistrust in physicians compared to Whites.^{24,25} These factors may contribute to racial differences in medication adherence.²⁶ However, no significant racial differences in PDM were seen in this sample, and racial differences in adherence persisted in a model controlling for this variable. The

	Black Participants			White Participants		
	Adherent	Nonadherent*	P valuet	Adherent	Nonadherent*	P valuet
Mean age (SD)	58 (11)	59 (15)	.821	66 (10)	62 (9)	.043
Married (%)	44	59	.284	68	75	.472
Some college education (%)	65	48	.202	52	60	.456
Arthritis severity						
(mean WOMAC score [SD])	61 (14)	49 (18)	.014	51 (17)	51 (13)	.835
Participatory decision-						
making score (mean [SD])	23 (8)	19 (9)	.078	20 (8)	18 (8)	.225
Medication side effects (%)	23	28	.702	18	38	.029

Table 4.	Relationships of su	bjects with three-item	composite medication	adherence measure	according to race
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* Defined as a positive response to one of three questions assessing nonadherent behaviors

† Results of t test for continuous variables and chi square tests for categorical variables.

lack of racial difference in PDM in this study may be related to similar educational levels between the two groups. Additional studies are needed to examine racial differences in participatory decision making and analgesic/anti-inflammatory medication adherence in populations where education levels and socioeconomic status are more disparate between racial groups. In this sample, some factors that may have contributed to racial differences in adherence include health literacy, aspects of patientphysician communication not captured in the participatory decision making scale, and comorbidities/polypharmacy.12,27,28 Racial differences in response to these medications (eg, degree of decrease in pain) may have been related to adherence. However, pharmacogenetic studies have not yet examined racial differences in response to analgesic and anti-inflammatory drugs.

Overall, nonadherence was high in this [Black and White veteran] sample; 44% of participants reported at least one nonadherent behavior related to OA medications.

Greater levels of participatory decision making were associated with reduced odds of nonadherence. Participatory decision making positively influences outcomes in various chronic diseases.^{29,30} This study suggests that adherence may be one mediator of the relationship between participatory decision making and better health outcomes. Participatory decision making may be particularly important in the context of chronic conditions such as OA, where treatment extends over long periods of time, multiple medication options are available, pain control is typically incomplete, and side effects are common. Physicians should be encouraged to engage patients in treatment decisions regarding medications for OA. However, time constraints placed on clinic visits may make medication education difficult,19 and other resources, such as healthcare extenders and supplemental education interventions, may facilitate informed decision making. One study examined a computer-based intervention aimed at enhancing patient involvement in decisions regarding analgesic/anti-inflammatory medication use.31 This intervention resulted in increased levels of appropriate medication use, as well as improvements in medication knowledge, realistic expectations of drug benefits, and ease of adherence. This type of intervention could enhance participatory decision making and medication adherence across many chronic illnesses.

Greater arthritis severity was associated with decreased odds of nonadherence for Black participants in this sample but not for White participants. This finding may be partially explained by racial differences in the perceived efficacy of various types of arthritis treatments. One study showed that Black patients were more likely than Whites to perceive Tylenol as efficacious.32 Black patients may perceive prescription analgesic/anti-inflammatory medications as more efficacious than Whites as well. Racial differences in the use of more invasive arthritis treatments, particularly arthroplasty, are well documented. White patients have higher rates of both hip and knee arthroplasty than Blacks,^{33,34} and recent research has shown that Black patients are less likely to be familiar with arthroplasty, are less willing to undergo arthroplasty, view arthroplasty as less efficacious, and are more concerned about adverse outcomes.^{32,35,36} In this study, Black participants may have increased medication adherence to manage greater arthritis severity, while White participants may have sought more invasive treatments, such as joint replacement surgery, to manage arthritis symptoms.

This study has several limitations. First, this sample included patients from one VA medical center and was composed mainly of male patients. Additional research is needed to examine these patterns in other patient samples. Second, non-response to the survey was substantial. Patients who did not show up for their interviews were similar in race and age to those who completed the interview. However, whether these groups differed with respect to OA severity, general health status, or socioeconomic status is not known. Third, this study sample size was too small to allow full multivariable analyses for each racial group separately. Fourth, there are some limitations are associated with the Morisky et al¹⁵ measure of adherence in the context of arthritis. This measure captures important components of general medication adherence, such as being forgetful or careless about taking medications; however, arthritis-specific components, such as responding appropriately to GI side effects, are not captured by this generic measure. Furthermore, the third item of this measure is not appropriate when medications are prescribed as needed. An adherence measure for OA-related medications is needed, particularly given the high rate of discontinuation of these drugs7 and the expected growth in the number of older adults who will seek treatment for OA in the next several decades.⁴

This study found a high prevalence of self-reported nonadherent behaviors among Black and White veterans with OA. This finding may have implications for pain control, and patient education is needed to enhance appropriate use of analgesic/anti-inflammatory drugs.³¹ Self-reported nonadherence was more common among Black patients than White patients in this sample. Factors underlying racial differences in medication adherence have not been well studied, and this area is critical for future research. Understanding these factors is an important step toward developing appropriate and effective educational interventions and clinical strategies for enhancing adherence.

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AUTHOR CONTRIBUTIONS

Design and concept of study: Dominick Acquisition of data: Dominick Data analysis and interpretation: Dominick, Golightly, Bosworth Manuscript draft: Dominick, Golightly, Bosworth Statistical expertise: Dominick, Bosworth Acquisition of funding: Dominick Administrative, technical, or material assistance: Golightly, Bosworth Supervision: Dominick, Bosworth

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