

# Calcium Supplement Use by African American Women

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**Introduction:** Inadequate calcium intake is more common among women belonging to racial and ethnic minorities. This study examined the patterns and characteristics associated with calcium supplement use or nonuse among African American women, and the potential impact of physician recommendation on calcium supplementation.

**Methods:** African American women aged 19 to 65, attending community outreach activities sponsored by a multispecialty academic medical center in northeastern Ohio, completed a calcium supplement survey. Survey items included demographic and bone health-related information, and rationale for calcium supplement use or nonuse.

**Results:** Of 160 respondents, 14% of women regularly took calcium supplements, 16% were former users, and 70% never used calcium supplements. Characteristics associated with calcium use status included age, multivitamin use, and marital status. Few African American women recall discussions with their doctors about calcium intake. Most who formerly took calcium supplements and most who had never taken them were willing to do so if recommended by their physician.

**Discussion:** Calcium supplement use among African American women in this study was low. However, many of the barriers to calcium supplement use by African American women appear remediable through brief calcium intake counseling by their physician.

**Keywords:** complementary and alternative medicine and supplements ■ osteoporosis ■ prevention ■ African Americans ■ women's health

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## INTRODUCTION

Osteoporosis is a metabolic bone disease characterized by low bone mineral density (BMD) and microarchitectural disruption, resulting in increased risk for fracture. African American women achieve higher peak BMD and have an incidence of osteoporosis about one-half that of white women.<sup>1-3</sup> However, when African American women sustain osteoporotic fractures, they suffer greater associated morbidity and mortality.<sup>4,5</sup>

Optimum calcium intake lowers the risk of osteoporosis. Continuing Survey of Food Intakes by Individuals and the National Health and Nutrition Examination Surveys (NHANES) consistently document inadequate calcium intakes by African American females throughout the lifespan.<sup>6</sup> Calcium supplement use is less common among African American women.<sup>7</sup> It also appears that significant disparities exist in osteoporosis preventive care.<sup>8-10</sup> In one study, when compared to African American women and after adjustment for other osteoporosis risk factors, white women had 3 times the odds of discussing osteoporosis with their doctor and 2.4 times the odds of a physician recommendation to take calcium.<sup>11</sup>

Sources of calcium intake include diet and supplements. While barriers to dietary intake have been examined, determinants of calcium supplement use are not well understood.<sup>12,13</sup> The purpose of this study was to examine patient characteristics associated with calcium supplement use among African American women and to identify barriers to calcium supplement use.

## METHODS

This study utilized a cross-sectional survey design. Study approval was obtained through the Cleveland Clinic institutional review board. Using a standardized verbal script, along with a participant information sheet to assure informed consent, community outreach nurses affiliated with a multispecialty academic medical center in northeastern Ohio (the Cleveland Clinic) administered anonymous questionnaires to a convenience sample of women attending longstanding community outreach venues, including outreach clinics and neighbor-to-neighbor educational program sites. All women aged 19 to 65

attending the community outreach venues were invited to participate. Three versions of the surveys were devised reflecting current, former, and never use of calcium supplements. Survey items included demographic information, health behaviors, knowledge, and beliefs relevant to calcium use and osteoporosis prevention. Relevant individual items were obtained from 2 validated scales, the Osteoporosis Knowledge Assessment Tool<sup>14</sup> and the Osteoporosis Health Behavior Scale.<sup>15</sup> Surveys of former users and never users began with a single open-ended question about the major reason for discontinuation or non use of calcium supplement, followed by a series of closed dichotomous (agree vs disagree) statements, based on literature review and clinician experience, about reasons for discontinuation or nonuse. The original survey, previously reported elsewhere, was modified and pilot tested in community outreach venues by the nurses prior to dissemination.<sup>16</sup> Only surveys completed by African American women, as determined by their self-report in the survey, are reported in this manuscript.

Differences among calcium supplement use groups were analyzed by means of  $\chi^2$  and analysis of variance statistics. Independent predictors of calcium supplement use status were determined by standard linear discriminant analysis using version 16.0 of SPSS (SPSS Inc, Chicago, Illinois). A direct-entry method was used in which all significantly associated univariate variables were entered into the analysis simultaneously. Once the significant discriminant functions were identified, the standardized function coefficients were then interpreted and used to predict group membership.

Responses to the open-ended question about reasons for discontinuation or nonuse of supplements were cate-

gorized thematically by the coauthors after data collection was completed and compared to the information derived from the close-ended checklists.

## RESULTS

More than 95% of eligible women participated in the survey, and fewer than 5% of these required the assistance of the community outreach nurses to complete them. Fewer than 2% returned partially completed surveys; these were included in the analysis. The 160 survey respondents are described in Table 1. Fifty-four percent had completed at least some college, 47% had children, 40% were current smokers, 34% took a multivitamin regularly, and 75% rated their health as good or better. Fourteen percent of women regularly took calcium supplements, 16% were former users, and 70% never used calcium supplements. Healthy behaviors reported here are considerably lower than those reported for a predominantly Caucasian sample receiving medical care from the same institution.<sup>16</sup> Associations between calcium supplement use status and demographics, health behaviors and health beliefs are found in Table 2. There was no relationship between supplement use status and education, self-perceived risk for osteoporosis, receipt of annual physical examination, child care or elder care responsibilities, and self-rated health. There were statistically significant associations between calcium use status and age, multivitamin use, and marital status. Using these 3 variables in a discriminant analysis correctly classified 62% of current users, 58% of never users, but only 35% of former users.

On open-ended questioning, former users cited forgetfulness, disbelief in the necessity of supplementation, depletion of their supplement supply, and side effects as

**Table 1.** Demographic Description of Study Sample (N = 160)

Age, y	Mean, 39; SD, 14; range, 19-65
Education	2% No high school 17% Some high school 27% High school graduate 32% Some college 15% College graduate 7% Postcollege education
Marital status	23% Married
Children	47% Yes
Smoker	40% Yes
Alcohol	36% Yes
Illicit drugs	6% Yes
Take regular multivitamin	34% Yes
Annual physical exam	72% Yes
Health status	10% Excellent 25% Very good 40% Good 21% Fair 4% Poor
Current users (% , n)	14% (23)
Former users (% , n)	16% (25)
Never users (% , n)	70% (112)

the most common reasons for discontinuing calcium. From the checklist of potential reasons for discontinuation, the most predominant endorsement, in nearly three-quarters of former users, was simply “got out of the habit,” followed by forgetfulness, dislike of pills, and belief that intake was adequate through diet alone.

On open-ended questioning, women who had never taken calcium supplements most commonly cited lack of knowledge as the reason for nonuse, often adding that their physician had never recommended it. Less commonly, women indicated a belief that there was no need for supplementation or that their diet alone was adequate. Rarely did women cite dislike of pills or cost as reasons for nonuse. When compared to former users, women who never had taken calcium were more likely to report uncertainty about recommended calcium dose and to believe in the sufficiency of their dietary calcium intake as reasons for nonuse of supplements (Table 3.)

Only one-quarter of never users recalled any discussion with their physician about calcium intake. The potential impact of physician recommendation on calcium supplement use is described in Table 4.

## DISCUSSION

### Summary

This study of African American women attending community outreach programs offered by Cleveland Clinic registered nurses provides valuable insight into an important osteoporosis prevention behavior, the use of calcium supplements. Compared to nonusers, women presently taking calcium were more likely to be older, to be married, and to take a daily multivitamin. Compared to former users, women who had never used calcium supplements were more likely to report uncertainty about the recommended amount of calcium supplement and were more likely to believe that their diet alone provided adequate calcium intake. Importantly, both former and never users reported a high willingness to take calcium supplements if recommended to do so by their physician.

The following discussion emphasizes potential clinical applications of these findings to osteoporosis prevention efforts among African American women.

## Comparison to Studies of Other American Women

The frequency of calcium supplement use was remarkably similar to that reported by a survey study of African American and Hispanic women residing in Chicago but less than that of African American women participating in the Multiethnic Cohort Study.<sup>7,17</sup> Characteristics associated with calcium supplement use in this study are congruent with those found in a study of predominantly white women receiving primary health care through suburban Cleveland Clinic facilities.<sup>16</sup> In both studies, calcium supplement use status was associated with age, multivitamin use, and family history of osteoporosis. This suggests that women who perceive themselves at greater health risk, vis-à-vis age and family history, are more willing to take supplements for preventive health benefit.

In general, osteoporosis prevention behaviors have been associated with perceived risk for osteoporosis, which in turn is strongly associated with a family history of osteoporosis.<sup>18</sup> Women who perceive themselves at low risk for osteoporosis may benefit from risk assessment education and clarification about what constitutes a family history of osteoporosis.<sup>19</sup> Physicians should expand their questions regarding a family history of hip fractures to include inquiries about wrist, spinal compression fractures, or other clinical indicators of osteoporosis.

## Calcium Intake Counseling Among Women Who Never Used Calcium Supplements

Only one-quarter of women who never used calcium supplements recall any discussion about calcium intake by their physician. These women require clear education by their physicians that osteoporosis is an important health issue among African American women and that optimum calcium intake can diminish risk. More than half of never users believed their dietary intake calcium was sufficient, a marked contrast to national nutritional surveys, which document dietary calcium adequacy in fewer than one-quarter of African American women.<sup>20</sup> Additionally, few nonusers knew exactly how much calcium supplement to take.

In women who never used calcium supplements, brief calcium intake counseling begins with a rapid estimate of

**Table 2.** Association of Demographic and History Items With Calcium Supplementation Use/Nonuse

Item Stem	Current Users	Former Users	Never Users	$\chi^2$	p
	N = 23	N = 25	N = 112		
Age (mean)	48	37	37	F = 5.69	.004 <sup>a</sup>
Do you take a daily multivitamin? (% yes)	57	48	27	9.73	.008 <sup>a</sup>
Marital status (% not married)	52	83	81	9.38	.009 <sup>a</sup>
Family history of osteoporosis (% yes)	14	20	6	6.11	.047
Smoking (% yes)	23	32	45	4.41	.110
Illicit drugs (% yes)	0	0	8	4.20	.122
Alcohol (% yes)	17	42	38	4.03	.133

<sup>a</sup> Statistical significance at p=0.05 after adjusting for multiple hypothesis testing using the Benjamini-Hockberg correction.

dietary calcium intake, then designation of target calcium intake, followed by discussion about how the individual wishes to meet any deficit. Women desiring to meet intake needs through calcium supplements require specific information about dose and frequency of administration. Because of limited absorption with higher doses, calcium supplements should be limited to 500 mg aliquots. Since most African American women are vitamin D deficient, preparations containing vitamin D are advised.<sup>21</sup>

### Calcium Intake Counseling Among Women Who Formerly Used Calcium Supplements

Compared to the other 2 groups, former users were most likely to report a family history of osteoporosis and most likely to perceive themselves at risk for osteoporosis. Former users were aware of their risk of osteoporosis and at one time engaged in osteoporosis prevention behaviors. Calcium intake counseling strategies in these women should address patient-specific barriers to reinitiation and maintenance of supplement use.

Evidence-based strategies that promote adherence to prescription medications may also foster adherence to long-term calcium supplementation.<sup>22</sup> Women who frequently forget to take their supplements may find it useful to maintain supplement supplies at home, work, and in their purses. Those who dislike taking pills may prefer chewable candy-like supplements or decide to achieve target intakes through calcium-rich foods alone. Women who endorsed the notion that “experts do not seem to agree about the need for calcium” require explanation about the implications and limitations of high-profile studies, such as the Women’s Health Initiative, which has

been frequently misrepresented in the general press as suggesting that calcium provided no osteoporosis protective benefit.<sup>23</sup> Those who worry about the risk of kidney stones should be reassured that calcium supplements do not increase the risk for recurrent kidney stones.<sup>24</sup>

### Limitations

Limitations in this study primarily relate to the sampling frame. Because the survey respondents were women encountered through community outreach programs, African American women surveyed via other venues may report different calcium supplement patterns and associated characteristics. Women attending health education programs in particular may be more health conscious and engage in more preventive health behaviors than nonattendees. More than half of our respondents reported some college education. While in this study educational achievement was not associated with calcium supplement use, African American women with different sociodemographic characteristics might report different findings.

This brief survey was limited to supplemental calcium use and did not ascertain dietary calcium intake or total calcium intake. Other than age, factors affecting calcium intake requirements such as menopausal status were not examined.

### Broader Implications

Epidemiologic evidence suggests the impact of calcium intake in African Americans extends far beyond bone health to include potential benefits related to the prevention of hypertension and obesity. NHANES data demonstrated an inverse association between blood pressure

**Table 3.** Reasons for Not Taking Calcium Supplements Asked of All Former and Never Users

Item Stem	Former Users	Never Users	$\chi^2$	p
	N = 25	N = 112		
Unsure of amount to take (% agree)	8	92	79.8	.001 <sup>a</sup>
Get enough calcium from foods (% agree)	33	57	4.38	.036 <sup>a</sup>
Don't like to spend money on calcium supplements (% agree)	20	38	2.80	.94
Don't like to take pills in general (% agree)	36	52	2.16	.142
Experts don't agree on need for extra calcium (% agree)	22	32	1.01	.315
Worry calcium may cause kidney stones (% agree)	20	20	0.00	1.00

<sup>a</sup> Statistical significance at p=0.05 after adjusting for multiple hypothesis testing using the Benjamini-Hockberg correction.

**Table 4.** Impact of Physician's Recommendation on Potential Calcium Supplement Use

Item Stem	Former Users	Never Users	$\chi^2$	p
	N = 25	N = 112		
Would you consider resuming/taking calcium supplements if your doctor recommended it?			3.52	.32
Very likely	61%	65%		
Somewhat likely	30%	30%		
Not too likely	0%	3%		
Not at all likely	9%	2%		

and calcium intake from food, particularly among African Americans.<sup>25</sup> A trial of calcium supplementation in African American adolescents demonstrated significant lowering of diastolic blood pressure in those with the lowest calcium intakes at baseline.<sup>26</sup> In the Healthy Transitions Study, a longitudinal study of African American and white women during the menopausal transition, body fat was inversely associated with calcium intake. The authors concluded that ethnic differences in the intake of nutrients such as calcium may influence the effect of menopausal transition on obesity in African American women.<sup>27</sup>

## CONCLUSION

In this generally well-educated sample of African American women with a mean age of 39 years, just 14% of those surveyed were presently taking calcium supplements. An equal proportion of African American women formerly took supplements. Three-quarters of never users were unable to recall any calcium intake counseling by their physician. Many of the patient-identified barriers to calcium supplementation in African-American women appear to be amenable to brief, targeted, office-based educational interventions.

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## REFERENCES

1. Bohannon AD. Osteoporosis and African American women. *J Womens Health Gend Based Med*. 1999;8:609-615.
2. Luckey MM, Wallenstein S, Lapinski R, Meier, DE. A prospective study of bone loss in African-American and white women—a clinical research center study. *J Clin Endocrinol Metab*. 1996;81:2948-2956.
3. Looker AC, Orwoll ES, Johnston CC Jr, Lindsay RL, Wahner HW, Dunn WL, et al. Prevalence of low femoral bone density in older U.S. adults from NHANES III. *J Bone Miner Res*. 1997;12:1761-1768.
4. Jacobsen SJ, Goldberg J, Miles TP, Brody JA, Stiers W, Rimm AA. Race and sex differences in mortality following fracture of the hip. *Am J Public Health*. 1992;82:1147-1150.
5. Furstenberg A, Mezey M. Differences in outcome between black and white elderly hip fracture patients. *J Chronic Dis*. 1987;40:931-938.
6. Fulgoni V III, Nicholls J, Reed A, Buckley R, Kafer K, Huth P, et al. Dairy consumption and related nutrient intake in African-American adults and children in the United States: continuing survey of food intakes by individuals 1994-1996, 1998, and the National Health and Nutrition Examination Survey 1999-2000. *J Am Diet Assoc*. 2007;107:256-264.

7. Foote JA, Murphy SP, Wilkens LR, Hankin JH, Henderson BE, Kolonel LN. Factors associated with dietary supplement use among healthy adults of five ethnicities: the Multiethnic Cohort Study. *Am J Epidemiol*. 2003;157:888-897.
8. Miller RG, Ashar BH, Cohen J, Camp M, Coombs C, Johnson E, et al. Disparities in osteoporosis screening between at-risk African-American and white women. *J Gen Intern Med*. 2005;20:847-851.
9. Mudano AS, Casebeer L, Patino F, Allison JJ, Weissman NW, Kiefe CI, et al. Racial disparities in osteoporosis prevention in a managed care population. *South Med J*. 2003;96:445-451.
10. Pothiwala P, Evans EM, Chapman-Novakofski KM. Ethnic variation in risk for osteoporosis among women: a review of biological and behavioral factors. *J Womens Health*. 2006;15:709-719.
11. Gourlay ML, Callahan LF, Preisser JS, Sloane PD. Osteoporosis preventive care in white and black women in community family medicine settings. *South Med J*. 2007;100:677-682.
12. Zablah EM, Reed DB, Hegsted M, Keenan MJ. Barriers to calcium intake in African-American women. *J Hum Nutr Diet*. 1999;12:123-132.
13. Byers KG, Savaiano DA. The myth of increased lactose intolerance in African-Americans. *J Am Coll Nutr*. 2005;24:569S-573S.
14. Winzenberg TM, Oldenburg B, Frendin S, Jones G. The design of a valid and reliable questionnaire to measure osteoporosis knowledge in women: the Osteoporosis Knowledge Assessment Tool (OKAT). *BMC Musculoskelet Disord*. 2003;4:17.
15. Cadarette SM, Beaton DE, Hawker GA. Osteoporosis health belief scale: minor changes were required after telephone administration among women. *J Clin Epidemiol*. 2004;57:154-166.
16. Tyler CV, Werner JJ, Panaite V, Snyder SM, Ford DB, Conway JL, et al. Barriers to supplemental calcium use among women in suburban family practice: a report from the Cleveland Clinic Ambulatory Research Network (CleAR-eN). *J Am Board Fam Med*. 2008;21:293-299.
17. Geller SE, Derman R. Knowledge, beliefs, and risk factors for osteoporosis among African-American and Hispanic women. *J Natl Med Assoc*. 2001;93:13-21.
18. Gerend MA, Erchull MJ, Aiken LS, Maner JK. Reasons and risk: factors underlying women's perceptions of susceptibility to osteoporosis. *Maturitas*. 2006;55:227-237. Epub 2006 May 2.
19. Unson CG, Fortinsky R, Prestwood K, Reisine S. Osteoporosis medications used by older African-American women: effects of socioeconomic status and psychosocial factors. *J Community Health*. 2005;30:281-297.
20. Arab L, Carriquiry A, Steck-Scott S, Gaudet MM. Ethnic differences in the nutrient intake adequacy of premenopausal US women: results from the Third National Health Examination Survey. *J Am Diet Assoc*. 2003;103:1008-1014.
21. Zadshir A, Tareen N, Pan D, Norris K, Martins D. The prevalence of hypovitaminosis D among US adults: data from the NHANES III. *Ethn Dis*. 2005;15: S5-97-101.
22. Osterberg L, Blaschke T. Adherence to medication. *N Engl J Med*. 2005;353:487-497.
23. Grady D. Women's health studies leave questions in place of uncertainty. *The New York Times*. 19 February 2006.
24. Curhan GC, Willett WC, Knight EL, Stampfer MJ. Dietary factors and the risk of incident kidney stones in younger women: Nurses' Health Study II. *Arch Intern Med*. 2004;164:885-891.
25. Sempos C, Cooper R, Kovar M, Johnson C, Drizd T, Yetley E. Dietary calcium and blood pressure in National Health and Nutrition Examination Surveys I and II. Hypertension. 1986;8:1067-1074.
26. Dwyer J, Dwyer K, Scribner RA, Sun P, Li L, Nicholson LM, et al. Dietary calcium, calcium supplementation, and blood pressure in African American adolescents. *Am J Clin Nutr*. 1998;68:648-655.
27. Lovejoy JC, Champagne CM, Smith SR, de Jonge L, Xie H. Ethnic differences in dietary intakes, physical activity, and energy expenditure in middle-aged, premenopausal women: the Healthy Transitions Study. *Am J Clin Nutr*. 2001;74:90-95. ■