CLINICAL STUDIES

Attempts at Changing Dietary and Exercise Habits to Reduce Risk of Cardiovascular Disease: Who's Doing What in the Community?

Randal J. Thomas, MD, MS;[1] Thomas E. Kottke, MD, MSPH;[1] Mark J. Brekke, MA;[3] Lee N. Brekke, PhD;[3] Catherine L. Brandel, BSN;[1] Lee A. Aase, BS;[2] Stephen W. DeBoer, MPH[1]

The objective of this study was to characterize adults in Olmsted County, MN who were attempting to change both their dietary and physical activity habits. A random digit-dial telephone survey was taken of 1232 adults, with questions about lifestyle, medical conditions, demographics, and receipt of previous lifestyle advice from a health care professional. Respondents were grouped in four categories: 1) changing neither diet nor exercise habits (22%); 2) changing diet habits only (20%); 3) changing exercise habits only (9%); and 4) changing both diet and exercise habits (49%). Along with several demographic and behavioral factors, receipt of physician advice to change exercise and dietary habits was a strong predictor of attempts to change both lifestyle habits. Only a minority of the population (23%), however, reported having received such advice. These results support the positive impact of health professional advice on dietary and exercise change in the population. Public health campaigns should be aimed at increasing the provision of such advice. (Prev Cardiol. 2002;5:102–108) ©2002 CHF, Inc.

Dietary and exercise habits both impact a number of health conditions that are associated with the development of coronary heart disease (CHD), including hypertension, hyperlipidemia, type 2 diabetes mellitus, and obesity.[1–3] Because of this association, public health campaigns and clinical practice guidelines have generally included dietary and exercise guidelines as important initial steps in controlling CHD and its risk factors.[4–7] Goals from *Healthy People 2010*,[4] for instance, include the daily intake of two or more fruits and three or more vegetables, along with physical activity of 30 minutes or more each day.

Despite these endorsements from national expert panels, the majority of adults in the United States are not meeting the recommendations for dietary and exercise goals. Recent evidence, in fact, suggests that lifestyle habits are not improving over time despite national health promotion campaigns. Data from the Centers for Disease Control and Prevention show that the percentage of adults achieving recommended levels of physical activity remained fairly flat in the last decade—24.3% of adults in 1990 and 25.4% of adults in 1998.[8] In addition, fewer than 10% of adults currently meet the recommended intake of five servings of fruits and/or vegetables per day.[9] Published data are scarce, but it is thought that fewer than 5% of adults meet both dietary and exercise recommendations each day.[10]

Even less is known about the percentage and characteristics of people in the general population who are attempting to improve both their dietary and their exercise behaviors. This is an important issue, since such information can help planners of public health campaigns adjust their messages and programs to the level of the population's readiness to change their dietary and exercise habits.[11] Just as an individual's readiness to change health behaviors affects his or her receptivity to health advice from a health professional, a population's collective receptivity to public health campaign "advice" is also determined by their readiness to change the targeted behaviors.[11–14]

A number of factors have been reported to have a beneficial impact on receptive patients' attempts to improve lifestyle habits. Physician advice to patients, even when brief, is one of these factors.[15–19] Despite

From the Department of Medicine[1] and Division of Communications,[2] Mayo Clinic and Foundation, Rochester, MN; and Brekke Associates, Inc., Minneapolis, MN[3]
Address for correspondence:
Randal J. Thomas, MD, MS, 200 First Street, SW, Mayo Clinic and Foundation, Rochester, MN 55905
E-mail: Thomas.Randal@Mayo.edu
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this, physicians are often reluctant to give dietary and exercise advice to their patients because of perceptions that such advice will have little or no impact on patient behavior.

To help address these issues further, this analysis was carried out with the following purposes: 1) to measure the prevalence of self-reported attempts to change dietary and exercise behaviors in the community; 2) to identify those groups of individuals who are most likely to be attempting lifestyle change; and 3) to assess the prevalence and relative impact of dietary and exercise advice from health care professionals in the community.

METHODS

Survey

A random digit-dial telephone survey of residents from Olmsted County, MN was undertaken as part of the baseline evaluation of the CardioVision 2020 project. CardioVision 2020 is a multidisciplinary project, organized by the Mayo Clinic Division of Cardiovascular Diseases, that is aimed at minimizing the population burden of cardiovascular disease for local residents by promoting 1) a tobacco-free environment; 2) healthy nutrition habits; 3) a physically active lifestyle for all children and adults; 4) optimal control of serum cholesterol levels; and 5) optimal blood pressure control.

The community survey collected information from a stratified random sample of Olmsted County residents, using CHD-related questions from the Behavioral Risk Factor Surveillance System developed by the Centers for Disease Control and Prevention. Survey questions asked for information regarding sociodemographics, health perceptions, self-reported lifestyle behaviors, and self-reported CHD risk factors. Among other questions, respondents were asked the following two-part question: "To lower your risk of developing heart disease or stroke, are you: a) eating fewer high-fat or high-cholesterol foods? (Yes/No); b) exercising more? (Yes/No)." They were also asked the following, previously validated question on physical activity[20]: "Aside from any work that you do at home or at a job, do you do anything regularly, that is, on a daily basis, that helps keep you physically fit? (Yes/No)." Additional questions included: "Would you say that, in general, your health is...1) excellent; 2) very good; 3) good; 4) fair; or 5) poor?" and "To lower your risk of developing heart disease or stroke, has a doctor advised you to: a) eat fewer high-fat or high-cholesterol foods? (Yes/No); b) exercise more? (Yes/No)." In addition, respondents were asked to report the frequency of their intake of fruit juices, fruit, green salad, potatoes (not including french fries, fried potatoes, or potato chips), carrots, and other vegetables. They were also asked the questions, "Are you now trying to lose weight?" and, "Are you now trying to maintain your current weight, that is, keep from gaining weight?"

Additional details on the survey collection process have been previously reported.[10] In brief, 5668 initial telephone calls were made to identify 1232 individuals who consented to take part in the baseline survey. The survey was stratified in order to insure similar distribution of respondents (approximately 100) into each of the six age strata (20–29 years, 30–39 years, 40–49 years, 50–59 years, 60–69 years, and 70+ years) for each gender.

Statistical Analysis

For purposes of analysis, survey respondents were grouped into four categories: 1) those attempting neither to change dietary nor physical activity habits; 2) those attempting to change dietary habits only; 3) those attempting to change physical activity habits only; and 4) those attempting to change both dietary and physical activity habits. A variety of individual characteristics were compared between the groups. Dichotomous variables were tested for significant between-group differences using chi-square analysis. Between-group mean differences for continuous data variables were tested for significance by analysis of variance. Those variables found to be significantly different between the four subgroups were included in a multivariate logistic regression model to identify those factors that were significantly associated with attempts to change both dietary and exercise habits. Pearson's correlation was calculated to assess the relationship between 1) attempts at changing dietary habits and attempts at changing exercise habits; 2) attempts at changing dietary habits and reported daily intake of fruits and vegetables; and 3) attempts at changing exercise habits and reported daily physical activity. Data from each respondent were weighted to reconstruct the relative proportions of age/gender groups from the estimated 1998 Olmsted County population, based on United States Census estimates. All analyses are based on weighted data.

RESULTS

Among the 1232 persons who responded to the 1999 CardioVision 2020 Community Survey, 22% reported that they were attempting to improve neither their dietary nor their exercise habits, 20% reported current attempts to change dietary habits only, 9% reported current attempts to change exercise habits only, and 49% reported current attempts to change both dietary and exercise habits. In all, 69% reported current attempts to change dietary habits and 58% reported attempts to change exercise habits. Compared to those not attempting changes in these lifestyle habits, those respondents attempting to change dietary habits were more likely to consume five fruits and/or vegetables per day (31% vs. 17%; $p<0.0001$) and those attempting to change exercise habits were more likely to engage in daily physical activity (69% vs. 35%; $p<0.0001$). The correlation between attempts to

change dietary habits and attempts to change exercise habits was moderately strong (Pearson's correlation, 0.39).

Table I shows various characteristics of persons in each of the four dietary-exercise change subgroups: 1) those changing neither dietary nor exercise habits; 2) those changing dietary habits only; 3) those changing exercise habits only; and 4) those changing both exercise and dietary habits. Compared to persons in the other groups, persons changing both exercise and dietary habits were more likely to be: 1) female; 2) non-Hispanic white; 3) in excellent or very good health; 4) trying to lose weight; 5) nonsmokers; 6) eating five or more fruits and/or vegetables daily; and 7) performing daily physical activity. In addition, they were more likely to have been diagnosed with hypercholesterolemia or hypertension, and were more likely to report having received advice from a health professional to reduce risk of cardiovascular disease (CVD) by changing dietary or exercise habits or by losing weight. While persons attempting

Table I. Self-Reported Individual Characteristics by Lifestyle Change Group

	Not Changing Diet or Exercise	Changing Diet Only	Changing Exercise Only	Changing Diet and Exercise	*P*
Total population	266 (22%)	247 (20%)	109 (9%)	610 (49%)	
Age in years (SD)	40.7 (17.6)	48.6 (16.3)	42.3 (16.9)	45.7 (15.6)	NS
Gender					
Women	16%	20%	8%	56%	<0.0001
Men	28%	20%	10%	42%	
Race/ethnicity					
Non-Hispanic whites	22%	20%	8%	50%	0.03
Other groups	23%	18%	17%	42%	
Perceived health					
Very good or excellent	21%	18%	9%	52%	0.05
Good, fair, or poor	21%	24%	9%	45%	
Perceived CHD risk					
>Average	19%	23%	7%	51%	NS
<Average	23%	19%	9%	49%	
BMI (kg/m^2)					
>30	18%	24%	12%	46%	0.08
≤30	23%	19%	8%	50%	
Trying to lose weight?					
Yes	14%	20%	10%	57%	<0.0001
No	29%	20%	8%	43%	
Trying to maintain weight?					
Yes	22%	22%	7%	49%	NS
No	21%	19%	10%	50%	
Smoking status					
Current smoker	26%	16%	12%	46%	0.03
Nonsmoker	21%	21%	8%	50%	
Fruits and/or vegetables per day					
≥5	15%	17%	5%	64%	<0.0001
<5	24%	21%	10%	44%	
Daily physical activity?					
Yes	13%	13%	10%	64%	<0.0001
No	31%	28%	8%	32%	

CHD=coronary heart disease; BMI=body mass index

Table II. Percentage of Population With Self-Reported CVD and Related Risk Factors, by Lifestyle Change Group

	Changing Neither Diet nor Exercise	Changing Diet Only	Changing Exercise Only	Changing Diet and Exercise	*P*
High cholesterol	7%	25%	7%	61%	<0.0001
High BP	13%	24%	8%	55%	0.0002
Diabetes	9%	30%	7%	54%	0.06
CHD	14%	17%	8%	61%	NS
Stroke	28%	17%	13%	42%	NS
CVD	18%	17%	10%	55%	NS
Any comorbid CHD-related condition	12%	23%	8%	57%	<0.0001

CVD=cardiovascular disease; BP=blood pressure; CHD=coronary heart disease

Table III. Self-Reported MD Advice About Diet, Exercise, and Weight Loss, by Lifestyle Change Group

	Changing Neither Diet nor Exercise	Changing Diet Only	Changing Exercise Only	Changing Diet and Exercise	*P*
Professional advice about diet	9%	22%	5%	64%	<0.0001
Professional advice about exercise	9%	21%	9%	61%	<0.0001
Professional advice about diet and exercise	7%	17%	6%	70%	<0.0001
Professional advice to lose weight	10%	18%	7%	65%	0.0001

to change both dietary and exercise habits tended to be older than those not making such attempts, mean age was not significantly different between the four groups.

Table II shows the percentage of respondents who reported CVD and related risk factors by lifestyle change group. Except in those with a previous stroke, the majority of respondents in all subgroups reported attempts to improve both dietary and exercise habits. The majority of respondents reporting previous receipt of professional advice about weight loss, dietary change, or exercise change also reported making attempts to improve both dietary and exercise habits, as shown in Table III. This was particularly the case in the group who reported receipt of advice about dietary and exercise change, in whom 70% reported attempts to change both lifestyle habits.

Results of multivariate logistic regression analysis (Table IV) revealed the following characteristics to significantly predict attempts to change dietary and exercise habits: 1) gender (women>men; beta=0.36; $p=0.008$); 2) self-reported health status (excellent or very good>good, fair, or poor; beta=0.28; $p=0.046$); 3) trying to lose weight (beta=0.90; $p<0.0001$); 4) trying to maintain weight (beta=0.64; $p=0.002$); 5) number of fruits and vegetables eaten per day (beta=0.16; $p<0.0001$); 6) daily physical activity (beta=1.17; $p<0.0001$); 7) receipt of dietary advice to lower CVD risk (beta=0.68; $p=0.0001$); 8) receipt of exercise advice to lower CVD risk (beta=0.39; $p=0.16$); and 9) current body mass index (beta = −0.033; $p=0.018$). Of interest, the presence of a comorbid CHD condition (hypercholesterolemia, hypertension, diabetes mellitus, previous CHD, or previous stroke) was not an independent predictor of attempts to change dietary and exercise habits. Comorbid CHD conditions and provision of dietary and exercise advice were strongly correlated (see Table V). While only 11% of respondents without comorbid CHD conditions reported receiving both dietary and exercise advice from a health care professional, 43% of those with CHD-related conditions reported receiving such advice ($p<0.001$).

DISCUSSION

We found, in a community-based survey of 1232 adult residents of Olmsted County, MN, that a majority of the adult population is actively trying to improve their dietary or exercise habits—69% are attempting to improve their dietary habits and 58% are attempting to improve their exercise habits.

Table IV. Results of Multiple Logistic Regression Analysis for Predicting Attempts to Change Both Dietary and Exercise Habits*

PREDICTOR VARIABLE	PARAMETER ESTIMATE	STANDARD ERROR	*P*
Daily physical activity	1.17	0.13	<0.0001
Trying to lose weight	0.90	0.21	<0.0001
Number of fruits and vegetables per day	0.16	0.03	<0.0001
Trying to maintain weight	0.64	0.20	0.002
Received dietary advice	0.68	0.18	0.0001
Received exercise advice	0.39	0.16	0.014
Gender (male)	–0.36	0.13	0.008
Perceived general health (excellent or very good)	0.28	0.14	0.046
Current BMI	–0.033	0.014	0.018

BMI=body mass index; *other predictor variables included in the analysis that were not statistically significant: age, perceived coronary heart disease risk, race/ethnicity, smoking status, and history of high cholesterol, high blood pressure, diabetes mellitus, coronary heart disease, and stroke.

Table V. Correlation Between Advice to Change Dietary and Exercise Habits to Lower CVD Risk and Presence of Hypercholesterolemia and Hypertension

	PREVIOUS DIAGNOSIS OF HYPERCHOLESTEROLEMIA	PREVIOUS DIAGNOSIS OF HIGH BLOOD PRESSURE
Received dietary advice to lower CVD risk	0.49 ($p<0.001$)	0.22 ($p<0.001$)
Received exercise advice to lower CVD risk	0.34 ($p<0.001$)	0.17 ($p<0.001$)
Received both dietary and exercise advice to lower CVD risk	0.45 ($p<0.001$)	0.18 ($p<0.001$)

CVD=cardiovascular disease

These findings support data reported previously by Laforge and coworkers,[21] who found that 60% of a large health maintenance organization population in the United States were in either the "action" or "maintenance" stage of dietary change, and that 50% were in either the action or maintenance stage of exercise change. Despite these encouraging findings, still only a minority of the population we surveyed is achieving recommended dietary and exercise goals—only 19% of the adult population report eating five fruits and/or vegetables and engaging in daily physical activity. These findings are important because they suggest that public health campaigns aimed at improving dietary and exercise habits will need to be directed, at least in part, to the significant segment of the adult population that is already trying to improve their dietary and exercise habits (unsuccessfully, for the most part). For these people, media campaigns and clinical practice initiatives should provide support and advice on how they can improve and maintain healthy dietary and exercise habits.

There are at least two limitations to our study. First, our analysis is based on self-reported data and therefore may not accurately describe the true dietary and exercise habits in our community. We did not collect objective measures of dietary or exercise habits in the population to validate the self-reported dietary and exercise habits. Questions we asked relative to dietary and exercise habits, however, were the same as those used in the Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System, a survey tool that has been widely used for monitoring cardiovascular disease risk factors and lifestyle habits throughout the United States since 1990.[22,23] Furthermore, similar survey tools have also used self-reported data previously to assess a population's readiness and attempts to change lifestyle habits.[21,24] A second limitation to our analysis is that the data are derived from one community at one point in time and may not be representative of other communities or populations. Previous analyses, however, suggest that the patterns of cardiovascular risk factors and lifestyle habits in Olmsted

County, MN are similar to those reported from the general US population[10] (S. DeBoer, unpublished data, 2002).

Several additional points from our findings are worth commentary. First, while previous reports have found moderately strong inverse correlations between leisure-time physical activity and dietary fat intake in adults,[25] it is unclear whether attempts at improving one habit are associated with attempts at improving the other. One report in older adults, in fact, found rather weak links between attempts at improving exercise and dietary habits.[26] To the contrary, our findings suggest a strong relationship between attempts at improving these two habits. Published data are lacking about the population's receptivity to simultaneous attempts at improving both dietary and exercise habits. Still, advice to modify both dietary and exercise habits is a basic component of practice guidelines for the management of hypercholesterolemia, hypertension, type 2 diabetes mellitus, and obesity generally in use today.[5–7,27] Some investigators would argue that multiple risk factor interventions are not as effective or acceptable to individuals as are targeted interventions aimed at single CVD risk factors.[28] To the contrary, we found that nearly one half of the population we surveyed was actively trying to improve both dietary and exercise habits simultaneously.

Second, our multivariate regression results suggest that persons with hypercholesterolemia, hypertension, diabetes, or CVD are no more likely to be attempting changes in dietary and exercise habits than are persons in the general population. In part, this may be due to the association between the provision of lifestyle advice and the presence of comorbid CVD conditions. Data from our survey suggest that this may be true, at least in the case of hypercholesterolemia. When receipt of dietary and exercise advice is left out of our multivariate model, the presence of hypercholesterolemia is a significant predictor of attempts at changing dietary and exercise habits. Furthermore, as shown in Table V, the correlation between hypercholesterolemia and provision of dietary and exercise advice is strong. The presence of hypercholesterolemia, therefore, appears to serve appropriately as a trigger to health care professionals for providing lifestyle advice to their patients. Similar data for persons with hypertension are less striking, suggesting that health professionals may rely less on lifestyle advice for hypertension control than for hypercholesterolemia control. Obesity, a central link to most comorbid CHD conditions, was only a weak predictor of attempts to change dietary and exercise habits, probably due to correlations with the much stronger predictors, trying to lose weight and trying to maintain weight.

Third, although a large percentage of persons with CVD or its risk factors report receiving advice to change their dietary and exercise habits and a majority are attempting to improve those habits, a large percentage of that high-risk population are still not receiving lifestyle advice and are not making attempts at lifestyle change, results that are consistent with previous reports.[29,30] These findings are particularly disappointing, since adherence to dietary and exercise recommendations is a strong predictor of CVD risk factor control.[31]

Finally, one of the most important findings from our report is the strong association between physician advice and attempts to change dietary and exercise habits. These results are not surprising, given the results of previous reports on the powerful impact of even brief lifestyle-related advice from health care providers on dietary change, exercise change, and smoking cessation.[32] Unfortunately, only a minority of respondents in our survey reported having previously received dietary or exercise advice from their health care provider, a finding that is also supported by previous reports.[33] Clearly, this represents a significant missed opportunity for CHD prevention by the health care community.

In summary, our findings suggest that the majority of adults in Olmsted County, MN, are actively trying to improve their dietary and exercise habits and appear to be open to health professional advice about these important lifestyle habits. Unfortunately, only a minority of patients report receiving such advice. Public health campaigns and clinical practice initiatives aimed at improving dietary and exercise habits in the population should include 1) prompts to individuals regarding ways they can improve and maintain their attempts at changing their dietary and exercise habits, and 2) prompts to health care providers regarding ways they can give brief, yet effective dietary and exercise advice to their patients.

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