APPLICATIONS

Dietetics professionals can play an important role in the nutritional practices of athletes. Dietitians should communicate with coaches and players, as many players use their strength coach for nutrition advice. Strength and conditioning coaches are often in a position to receive supplements and endorse products, so having a dietitian's input in purchasing and distributing supplements would help ensure proper handling of such procedures. Unfortunately, dietitians who work in athletics are often hired part-time or as consultants, which provides an additional challenge to their ability to influence athletes effectively. Our study demonstrates the need for dietetics professionals to become more involved in the decision-making processes of athletic nutrition. ■

The authors thank Rick Huegli for his assistance.

References

1. Juhn MS, Tarnopolsky M. Oral creatine supplementation and athletic performance: a critical review. *Clin J Sport Med.* 1998;8(4): 286-297.
2. Birch R, Noble D, Greenhaff PL. The influence of dietary creatine supplementation on performance during repeated bouts of maximal isokinetic cycling in man. *Eur J Appl Physiol.* 1994;69:268-276.
3. Dawson B, Cutler M, Moody A, Lawrence S, Goodman C, Randall N. Effects of oral creatine loading on single and repeated maximal short sprints. *Aust J Sci Med Sport.* 1995; 27(3):56-61.
4. Earnest CP, Snell PG, Rodriguez R, Almada AL, Mitchell TL. The effect of creatine monohydrate ingestion on anaerobic power indices, muscular strength and body composition. *Acta Physiol Scand.* 1995;153:207-209.
5. Kreider RB, Ferreira M, Wilson M, Grindstaff P, Plisk S, Reinardy J, Cantler E, Almada AL. Effects of creatine supplementation on body composition, strength, and sprint performance. *Med Sci Sports Exerc.* 1998;30: 73-82.
6. Vandenberghe K, Goris M, Van-Hecke P, Van-Leemputte M, Vangerven L, Hespel P. Long-term creatine intake is beneficial to muscle performance during resistance training. *J Appl Physiol.* 1997;83:2055-2063.
7. Volek JS, Kraemer WJ, Bush JA, Boetes M, Incledon T, Clark KL, Lynch JM. Creatine supplementation enhances muscular performance during high-intensity resistance exercise. *J Am Diet Assoc.* 1997;97:765-770.
8. Cooke WH, Grandjean PW, Barnes WS. Effect of oral creatine supplementation on power output and fatigue during bicycle ergometry. *J Appl Physiol.* 1995;78:670-673.
9. Odland LM, MacDougall JD, Tarnopolsky M, Elorriaga A, Borgmann A. The effect of oral creatine supplementation on muscle [PCr] and short-term maximum power output. *Med Sci Sports Exerc.* 1997;29:216-219.
10. Snow RJ, McKenna MJ, Selig SE, Kemp J, Stathis CG, Zhao S. Effect of creatine supplementation on sprint exercise performance and muscle metabolism. *J Appl Physiol.* 1998; 84:1667-1673.
11. Wallimann T, Hemmer W. Creatine kinase in non-muscle tissues and cells. *Mol Cell Biochem.* 1994;133-134:193-220.
12. Balsom PD, Soderlund K, Ekblom B. Creatine in humans with special reference to creatine supplementation. *Sports Med.* 1994; 18:268-280.
13. Hultman E, Soderlund K, Timmons JA, Cederblad G, Greenhaff PL. Muscle creatine loading in men. *J Appl Physiol.* 1996;81(1): 232-237.
14. Koshy KM, Griswold E, Schneeberger EE. Interstitial nephritis in a patient taking creatine. *N Engl J Med.* 1999;340:814-815.
15. Juhn MS, Tarnopolsky M. Potential side effects of oral creatine supplementation: a critical review. *Clin J Sport Med.* 1998;8(4): 298-304.
16. Javierre C, Lizarraga MA, Ventura JL, Garrido E, Segura R. Creatine supplementation does not improve physical performance in a 150 m race. *J Physiol Biochem. (Rev Esp Fisiol)* 1997;53:343-348.
17. Redondo DR, Dowling EA, Graham BL, Almada AL, Williams MH. The effect of oral creatine monohydrate supplementation on running velocity. *Int J Sport Nutr.* 1996;6:213-221.
18. Terrillion KA, Kolkhorst FW, Dolgener FA, Joslyn S. The effect of creatine supplementation on two 700-m maximal running bouts. *Int J Sport Nutr.* 1997;7:138-143.
19. Burke LM, Pyne DB, Telford RD. Effect of oral creatine supplementation on single-effort sprint performance in elite swimmers. *Int J Sport Nutr.* 1996;6:222-233.
20. Mujika I, Chatard JC, Lacoste L, Barale F, Geyssant A. Creatine supplementation does not improve sprint performance in competitive swimmers. *Med Sci Sports Exerc.* 1996; 28:1435-1441.
21. Thompson CH, Kemp GJ, Sanderson AL, Dixon RM, Styles P, Taylor DJ, Radda GK. Effect of creatine on aerobic and anaerobic metabolism in skeletal muscle in swimmers. *Br J Sports Med.* 1996;30:222-225.

Vegetarianism among US women physicians

RANDALL F. WHITE, MD; JENNIFER SEYMOUR; ERICA FRANK, MD, MPH

Although many studies have demonstrated an association between vegetarian diets and reduced risk of chronic disease (1-4), vegetarianism as a dietary choice is incompletely understood. The few studies that have examined the prevalence of vegetarianism in the general population or in specific groups have found low rates of vegetarianism, about 1% to 3% (4,5). Still fewer studies have asked participants about their specific eating habits and the relationship of those eating habits to their self-described status as vegetarian or omnivore. Further adding to the confusion is anecdotal evidence that suggests that many people identify themselves as vegetarian but continue to eat animal flesh.

The Women Physicians' Health Study (6-8) was designed to examine the demographics and the personal health and professional practices of US women physicians. Physicians have great influence as social role models and in communications with their patients; therefore, their personal health practices, such as vegetarianism, may affect their patient counseling practices (9-11). In this study, we investigated the prevalence and characteristics of vegetarian subjects in the Women Physicians' Health Study, and compared them to omnivores in the cohort. We also considered implications of self-reported vegetarianism by examining selected aspects of diet, health-related behaviors, and current and past personal health.

E. Frank (corresponding author), R. F. White, and J. Seymour are with the Emory University School of Medicine, 69 Butler St, Atlanta, GA 30303

METHODS

The design of the Women Physicians' Health Study and basic characteristics of the population have been more fully described elsewhere (6-8). We randomly selected 2,500 women from each of the past 4 decades' graduating medical-school classes. Our response rate was 59% of physicians eligible to participate (n=4,501). Analyses were conducted in SUDAAN (version 7.0, 1996, Research Triangle Institute, Research Triangle Park, NC), a statistical package that ad-

Table 1
Dietary and health-related characteristics of US women physician vegetarians (N=360) vs omnivores (N=4,002)

Characteristic[a]	Vegetarians	Omnivores	*P* value[b]
Average servings per day[c]			
Red meat[d] (n=338, n=3,717)	0.06±0.01	0.56±0.01	<.001
Poultry (n=337, n=3,800)	0.09±0.01	0.41±0.00	<.001
Fish (n=331, n=3,769)	0.11±0.01	0.21±0.00	<.001
Dairy (n=331, n=3,769)	1.49±0.09	1.28±0.02	.02
Eggs (n=298, n=3,707)	0.17±0.01	0.18±0.01	.4
Processed food[e] (n=326, n=3,686)	0.34±0.03	0.43±0.01	.003
Currently trying to change eating habits (%)[c]			<.001
Yes, low priority (n=78, n=1,050)	21.7±2.7	28.3±0.9	
Yes, high priority (n=94, n=1,516)	27.9±3.0	39.2±1.0	
No (n=172, n=1,328)	50.4±3.3	32.6±0.9	
Exercise (median min/wk)[c] (n=304, n=3,549)	196±20	174±5	.1
Current cigarette smokers (%) (n=7, n=177)	2.1±0.9	3.8±0.4	.09
Alcohol drinkers (%)[c] (n=184, n=2,802)	57.1±3.3	74.0±0.9	<.001
<2 days/week drinking[f] (%) (n=124, n=1,614)	77.5±3.9	71.0±1.1	.1
Self-reported cholesterol levels[c]			.004
<5.17 mmol/L[g] (n=188, n=1,711)	79.1±2.8	70.5±1.0	
5.17-5.67 mmol/L (n=36, n=489)	12.3±2.4	13.9±0.8	
5.68-6.21 mmol/L (n=22, n=325)	4.9±1.3	8.8±0.6	
>6.21 mmol/L (n=16, n=298)	3.7±1.1	6.9±0.5	
Reported being overweight (%)[c]			.006
Yes (n=76, n=1,226)	21.2±2.7	30.5±0.9	
Somewhat (n=104, n=1,137)	30.6±3.1	27.3±0.9	
No (n=168, n=1,535)	48.2±3.3	42.3±1.0	

[a]Sample sizes for each variable are listed parenthetically with vegetarians listed first.
[b]Tests of significance are *t* tests for average servings/day and χ^2 tests for all other variables.
[c]±standard error.
[d]Defined as beef, pork, hamburger, hot dogs, cold cuts.
[e]Defined as doughnuts, cookies, cakes, pastries, or french fries.
[f]>2 Drinks/wk represents the 75th percentile for alcohol intake; this statistic only includes current drinkers.
[g]To convert mmol/L cholesterol to mg/dL, multiply mmol/L by 38.7. To convert mg/dL cholesterol to mmol/L, multiply mg/dL by 0.026. Cholesterol of 5.00 mmol/L=193 mg/dL.

justs for survey sample design, producing correct standard errors for estimated proportions, means, and medians.

Nonrespondents were less likely than respondents to be board certified but did not consistently or substantively differ on other tested measures. The 716-item questionnaire included a 22-item food-frequency questionnaire and 2 direct queries related to prevalence: "Do you consider yourself to be a vegetarian?" and "How many days last week did you eat only vegetarian foods (no meat, fish, or fowl)?"

RESULTS

Prevalence of self-described vegetarianism was 8%; 5% of respondents reported having eaten no meat, fish, or fowl in the week before the survey. Vegetarianism was most common among 40- to 49-year-old female physicians (11%) and least common among the oldest and youngest physicians. Asian-Americans (15%) and those who self-categorized their ethnicity as "other" (30%) had the highest prevalence of vegetarianism, and African-American physicians had the lowest (3%). More than half of the Seventh-day Adventist (57%) and Hindu (54%) respondents were vegetarian. About one fifth of Buddhist and Mormon physicians were vegetarian, and Protestant (3%), Catholic (5%), and other Christian (5%) physicians were least likely to be vegetarian. There was an interaction between religion and ethnicity: 16% of Hindus and Buddhists self-categorized as ethnically "other," vs only 2% of those of other religions. Income was not associated with vegetarianism in this cohort, which has a much higher baseline income than the general population.

Physicians who characterized themselves as very liberal were almost twice as likely to describe themselves as vegetarian as those who characterized themselves as conservative (13% vs 7%). This trend did not change significantly when we removed from analyses those who said they were vegetarian for religious reasons. Neurologists had the highest prevalence of vegetarianism (31%) and ophthalmologists the lowest (2%) when physicians were stratified by specialty. There was an interaction between specialty and demographic correlates of vegetarianism: 52% of neurologists self-categorized as liberal (vs 37% of other specialists) and 13% were Hindu (vs 4% of other specialists); 21% of ophthalmologists self-categorized as liberal.

Table 1 provides a comparison of self-categorized vegetarians with omnivores for several self-reported dietary and health-related characteristics. The average number of servings per day reported for beef or pork was 0.6 for omnivores and 0.06 for vegetarians ($P<.001$); for poultry, 0.4 and 0.09 ($P<.001$); and for fish, 0.21 and 0.11 ($P<.001$). Self-reported intake of dairy and eggs was not statistically different between the groups, but omnivores ate more processed food ($P=.003$). Of self-categorized vegetarians, 59.3% ate animal flesh (meat, poultry, or fish) of some kind at least once in the preceding month. Vegetarians were significantly less likely to report being overweight and more likely to be content with their diet than omnivores, although similar proportions of women in both dietary groups reported that they were currently attempting to lose weight. Vegetarians reported lower levels of total cholesterol and were less likely to drink alcohol. Both vegetarian and omnivore physicians rated their health status similarly, with the majority of respondents stating they were in excellent or very good health (data not shown).

Self-categorized vegetarians were asked why they were vegetarians (Table 2), and could choose 1 or more listed reasons; 69.0% cited health reasons, 32.1% cited environmental reasons, 41.6% animal welfare, 30.0% religion, 40.6% taste, 25.7% weight, and 10.7% other. All of the vegetarian groups ate little red meat. Physicians who were vegetarian for weight or other health reasons had a slightly higher fish intake than did the other groups; religious vegetarians had a lower fish intake. Those who were vegetarian for religious reasons ate more dairy and processed food and exercised less than the other groups (data not shown). The group that was vegetarian for weight control ate more poultry and fish, less dairy and processed food, and exercised more (not shown). Using the food frequency questionnaire, we found that those subjects who ate animal flesh had higher self-reported levels of total cholesterol and high-density lipoprotein cholesterol than those who did not. Vegans reported the lowest levels of total and high-density lipoprotein cholesterol. Those who ate red meat were most likely to consider themselves over-

Table 2
Dietary intake in US women physicians

Dietary intake	Reason for being vegetarian						
	Health	Environment	Animal welfare	Religion	Taste	Weight	Other
Average servings per day for self-characterized vegetarians[a]							
Red meat[b]	0.05±0.01	0.04±0.01	0.04±0.01	0.05±0.02	0.06±0.01	0.07±0.02	0.06±0.02
Poultry	0.10±0.01	0.08±0.02	0.06±0.01	0.05±0.01	0.10±0.02	0.13±0.02	0.15±0.05
Fish	0.12±0.01	0.10±0.02	0.09±0.02	0.04±0.01	0.11±0.02	0.16±0.02	0.10±0.03
Dairy	1.41±0.10	1.49±0.16	1.44±0.13	1.81±0.18	1.46±0.14	1.22±0.16	1.36±0.21
Eggs	0.16±0.02	0.14±0.02	0.16±0.02	0.17±0.03	0.16±0.02	0.13±0.02	0.18±0.03

Physiologic outcomes of dietary intake for all responding women physicians	Median Block fat score[e]	Average cholesterol level[a,c]	Average HDL-cholesterol level[a,c]	% Reporting being overweight[a]		
				Yes	Somewhat	No
Eats red meat (n=3,750)	22.6±.3	4.71±0.02	1.58±0.02	30.5±1.0	27.5±0.9	42.0±1.0
Eats poultry (no red meat) (n=275)	11.1±9.5	4.63±0.08	1.59±0.05	23.5±3.4	29.2±3.5	47.3±3.9
Eats fish, no red meat or poultry (n=59)	12.1±9.1	4.67±0.13	1.51±0.12	17.5±6.6	37.6±8.4	44.9±8.4
Eats dairy/eggs, no meat, fish, fowl (n=137)	14.6±12.2	4.36±0.09	1.33±0.05	18.6±4.2	27.7±4.7	54.0±5.2
Vegan (n=11)	0.0±0.0	4.27±1.19	1.40±0.07	13.8±13.0	24.4±18.5	61.8±11.8
P value[d]	. . .[e]	.006	.0001			.04

[a]±standard error.
[b]Red meat was defined as beef, pork, hamburger, hot dogs, cold cuts.
[c]HDL=high-density lipoprotein. To convert mmol/L cholesterol to mg/dL cholesterol, multiply mmol/L by 38.7. To convert mg/dL cholesterol to mmol/L, multiply mg/dL by 0.026. Cholesterol of 5.00 mmol/L=193 mg/dL.
[d]Significance for means was calculated using the Wald *F* test; percent overweight was calculated using a χ^2 test.
[e]*P* value was not calculated for median Block fat score. Because the Block score was not created for use in vegetarian populations its use creates falsely low scores, especially for vegans.

weight, followed by those who excluded only red meat, and those who excluded poultry or all animal flesh; the lowest levels of overweight were reported by those who excluded all animal products.

DISCUSSION

Physicians are an interesting and important group in which to study personal health behaviors. First, given their high socioeconomic status, physicians would be expected to have a high prevalence of preventive behaviors compared with the general population (8,12). Second, physicians' personal health habits may influence their patient counseling practices (9). Viewing vegetarianism as a health-related dietary preference in this cohort is justified by our finding that 69% of the vegetarian physicians cited health as a reason for their diet.

The proportion of US physicians, men or women, who are vegetarian has been poorly characterized. The only other relevant survey of physicians (from Massachusetts in 1978) found that 1.5% called themselves vegetarian, but the study was small (n=289); only 8% of the subjects were women, and the researchers did not define vegetarianism (13).

Vegetarian diets come in many varieties, some more restrictive than others. Lacto-ovo-vegetarians consume dairy products and eggs, but vegans consume no animal-derived foods. The prevalence of vegetarianism and its subtypes in the United States is unknown, but a series of surveys of residents of central California during the 1980s found that, on average, 2% of the sampled population had eaten a vegan or low-fat lacto-ovo-vegetarian diet in the preceding week (4). A 1997 national Roper poll estimated that 1% of the population never eats meat, fish, or fowl, and that one third to one half of these vegetarians are vegan (5).

Vegetarianism is a dietary preference that is associated with some specific demographic characteristics in the population at large (14), and with certain religious groups, such as Seventh-day Adventists and Hindus. This survey confirmed the sectarian associations of vegetarianism. The higher prevalence of vegetarianism among self-categorized political liberals is not surprising, as vegetarianism is popularly associated with liberalism.

APPLICATIONS

Anecdotal information indicates that some people may call themselves vegetarian, when in fact they regularly consume seafood or chicken. Our study confirmed this, as more than half of self-defined vegetarians reported eating animal flesh, primarily poultry or fish, at least one time in the month preceding the survey. Those who were vegetarian for health reasons were more likely to consume animal flesh than others, implying that those with philosophical or religious motivation may tend to be dietary purists, and those with health motivations, pragmatists. "Vegetarians" who consume some animal flesh may resemble lacto-ovo-vegetarians in health-related behaviors and attitudes (15), but their health status in comparison to omnivores and to true vegetarians has not been adequately studied.

Vegetarians as a group are at lower risk for certain common diseases, such as ischemic heart disease, colon carcinoma, cholelithiasis, obesity, and type 2 diabetes mellitus (4). Among female vegetarians, however, a concern is a possible association between anorexia nervosa and vegetarianism, because young women with excessively restrictive diets may attempt to rationalize their eating disorder as a vegetarian diet (16). We found no significant difference (P=.3) in history of self-reported eating disorders between vegetarian (8%) and omnivore physicians (6%), although self-report is not equivalent to a diagnostic interview.

In addition to meat consumption, the diets of vegetarian respondents differed in other ways from those of omnivore respondents. As among other studied vegetarians (17), vegetarian women physicians drank less alcohol. They also consumed less processed, fatty foods. Such data support the widely held belief that vegetarians are health-conscious as a group (although the health consequences of moderate alcohol use are controversial), as well as confirm the more general concept of clustering of healthful behaviors. Dietetics and other health care practitioners should consider these associations in assessing the risks and potential for change of a subject's diet.

References

1. Burr ML, Butland BK. Heart disease in British vegetarians. *Am J Clin Nutr.* 1988;48: 830-832.
2. Key TJA, Thorogood M, Appleby PN, Burr ML. Dietary habits and mortality in 11,000 vegetarians and health-conscious people: results of a 17 year follow up. *BMJ.* 1996;313: 775-779.
3. Snowdon D. Animal product consumption and mortality because of all causes combined: Coronary heart disease, stroke, diabetes, and cancer in Seventh-day Adventists. *Am J Clin Nutr.* 1988;48:739-748.
4. White R, Frank E. Health effects and prevalence of vegetarianism. *West J Med.* 1994;160: 465-471.
5. Vegetarian Resource Group. How many vegetarians are there? *Vegetarian J.* 1997; 16 (5):21-22.
6. Frank E. The Women Physicians' Health Study: background, objectives, and methods. *J Am Med Wom Assoc.* 1995;50:64-66.
7. Frank E, Rothenberg R, Brown WV, Maibach H. Basic demographic and personal characteristics of US women physicians. *West J Med.* 1997;166:179-184.
8. Frank E, Brogan DJ, Mokdad AH, Simoes EJ, Kahn HS, Greenberg RS. Health-related behaviors of women physicians vs other women in the United States. *Arch Intern Med.* 1998;158:342-348.
9. Frank E, Kunovich-Frieze T. Physicians' prevention counseling behaviors: current status and future directions. *Prev Med.* 1995; 24:543-545.
10. Schwartz JS, Lewis CE, Clancy C, Kinosian MS, Radany MH, Koplan JP. Internists' practices in health promotion and disease prevention: a survey. *Ann Intern Med.* 1991;114:46-53.
11. Wells KB, Lewis CE, Leake B, Ware JE Jr. Do physicians preach what they practice? A study of physicians' health habits and counseling practices. *JAMA.* 1984;252: 2846-2848.
12. Winkleby MA, Jatulis DE, Frank E, Fortmann SP. Socioeconomic status and health: how education, income, and occupation contribute to risk factors for cardiovascular disease. *Am J Public Health.* 1992;82: 816-820.
13. Wyshak G, Lamb G, Lawrence R, Curran W. A profile of the health-promoting behavior of physicians and lawyers. *N Engl J Med.* 1980;303:104-107.
14. Freeland-Graves J, Greninger S, Young R. A demographic and social profile of age- and sex-matched vegetarians and nonvegetarians. *J Am Diet Assoc.* 1986;86:907-913.
15. Freeland-Graves J, Greninger S, Graves G, Young R. Health practices, attitudes, and beliefs of vegetarians and nonvegetarians. *J Am Diet Assoc.* 1986;86:913-918.
16. O'Connor M, Touyz S, Dunn S, Beaumont P. Vegetarianism in anorexia nervosa? A review of 116 consecutive cases. *Med J Aust.* 1987;147:540-542.
17. Phillips RL, Kuzma JW, Beeson WL, Lotz T. Influence of selection versus lifestyle on risk of fatal cancer and cardiovascular disease among Seventh-day Adventists. *Am J Epidemiol.* 1980;112:296-314.

Two small surveys, 25 years apart, investigating motivations of dietary choice in 2 groups of vegetarians in the Boston area

ESTHER H. J. KIM, MS, RD; KAREN M. SCHROEDER, MS, RD; ROBERT F. HOUSER, Jr, PhD; JOHANNA T. DWYER, DSc, RD

Health is an important motivation for choosing and following a vegetarian diet (1-3). In a 1992 survey, 46% of the vegetarians surveyed cited health as the most important reason for adopting their dietary style (3). However, health is rarely the only factor involved in this lifestyle decision. During the 1970s, many young adults adopted vegetarian eating patterns for health, ethical, spiritual, and philosophical reasons (2). Other motivations to abstain from animal foods have not been well studied (4,5). The purpose of this study was to investigate health, philosophical, ethical, and religious attitudes and motivations, nutrition knowledge, and eating practices of 2 groups of vegetarians residing in the area of Boston, Mass, one in 1974 and one in 1997.

E. H. J. Kim is the Cancer Center dietitian at New England Medical Center, Boston, Mass. At the time of the study, she was also with the Tufts University School of Nutrition Science and Policy, Boston, Mass. K. M. Schroeder is a writer and editor for the Center on Nutrition Communication at the Tufts University School of Nutrition Science and Policy, Boston, Mass. At the time of the study, she was also with the Frances Stern Nutrition Center at New England Medical Center, Boston, Mass. R. F. Houser, Jr, is a faculty member and research analyst at the Tufts University School of Nutrition Science and Policy, Medford, Mass. J. T. Dwyer is a professor of medicine and community health at the Schools of Medicine and Nutrition Science and Policy at Tufts University and the director of the Frances Stern Nutrition Center at New England Medical Center, Boston, Mass.

Address correspondence to: Esther H. J. Kim, MS, RD, Frances Stern Nutrition Center/New England Medical Center, 750 Washington St, Boston, MA 02111.

METHODS

Data were collected using the Food and Living Survey, which was developed and validated in focus groups by J. T. Dwyer in 1974. The 88-item survey queried many aspects of eating and lifestyle habits and motivations and measured nutrition knowledge.

In 1974, the survey was distributed to customers as they left health food stores and traditional supermarkets in the Boston area. In 1997, the survey was distributed at a vegetarian food fair held in Boston.

Respondents who completely avoided all animal products (vegans) or who completely avoided all meat, poultry, and fish but consumed eggs and dairy products (lacto-ovo-vegetarians) were classified as vegetarians. All other dietary patterns (including vegetarians who ate fish) were classified as nonvegetarian. For comparison, respondents were separated into 4 groups according to the year they participated in the survey, either 1974 or 1997, and their dietary pattern, that is, vegetarian or nonvegetarian.

Questionnaires were coded and analyzed using the Statistical Package for the Social Sciences for Windows (release 7.5.1, 1996, SPSS, Chicago, Ill). One-way analysis of variance with least significant difference and nonparametric Kruskall-Wallis independent sample tests were used to determine significance of differences between groups.

Summary scores were developed to provide an estimate of the relative strength of various motivations and attitudes. These scores were calculated from the items on the questionnaire relevant to health (n=9), philosophical (n=8), ethical (n=4), or religious (n=5) attitudes affecting eating choices, nutrition