Nutrition Research, Vol. 19, No. 12, pp. 1741–1748, 1999

0271-5317/99/$–see front matter

ELSEVIER

PII S0271-5317(99)00127-X

KNOWLEDGE AND ATTITUDES OF REGISTERED DIETITIANS CONCERNING VEGETARIAN DIETS

K.Duncan, M.S., R.D., and E.A. Bergman[1], Ph.D., R.D.
Department of Family and Consumer Sciences
Central Washington University, Ellensburg, WA 98926-7565

ABSTRACT

Registered Dietitians' (RD) knowledge and attitudes about the safety, adequacy and health benefits of vegetarian diets were estimated. A questionnaire was developed with demographic, knowledge, and attitude questions and was completed by 182 RDs from Washington, Nebraska and Vermont. The results showed that RDs in Vermont had significantly higher attitude scores regarding vegetarian diets than RDs in Nebraska (63% vs. 52% of questions answered correctly, respectively) and that RDs in Washington had significantly higher knowledge scores concerning vegetarian diets than RDs in Nebraska (73% vs. 67% of questions answered correctly, respectively). A significantly higher percentage of the RDs from Vermont, 52%, reported having followed some type of vegetarian diet compared to only 28% of the RDs from Washington or 12% of the RDs from Nebraska. Results also showed that RDs who had followed vegetarian diets at the time of the study or at some time in the past had significantly higher overall knowledge and attitude scores when compared with those RDs who had never followed vegetarian diets. There was a significant positive correlation between overall knowledge and overall attitude score for individual subjects. This suggests that increasing the knowledge base of RDs concerning vegetarian diets may lead them to consider meatless diets in a more positive light. In addition, average overall knowledge and attitude scores suggested that RDs are not up to date with current research in the field of vegetarian nutrition.

KEY WORDS: Vegetarian, Dietitian, Knowledge, Attitude

INTRODUCTION

Research concerning vegetarian diets is on the increase (1). Review of current research suggests that with appropriate attention to nutritional needs, the health consequences of a vegetarian

[1]Address Correspondence to Ethan A. Bergman, Dept. of Family and Consumer Sciences, Central Washington University, Ellensburg, WA 98926-7565, USA.

diet are neutral, and may even be positive (2). The American Dietetic Association Position Statement on Vegetarian diets declares "...that appropriately planned vegetarian diets are healthful, are nutritionally adequate, and provide health benefits in the prevention and treatment of certain diseases."(3)

According to Johnston (4), vegetarian dietary practices often are associated with a variety of images and attitudes regarding the individuals who choose them. In many cases those attitudes have a limited basis in actual fact. Those attitudes can greatly affect the counseling outcome when Registered Dietitians (RDs) advise vegetarian clients. Dwyer (5) pointed out that both the values of the individual RDs and scientific issues are involved when RDs evaluate specific diets. For this reason, the attitudes and knowledge of dietitians concerning vegetarian diets are equally important. Researchers (6,7,8) have reported a continued and growing interest in vegetarian diets across the country. Consequently, more and more dietitians are seeing vegetarian clients (8). However, research on the knowledge and attitudes of dietitians concerning vegetarianism is lacking in all geographic parts of the US.

The Vegetarian Resource Group, a non-profit organization which educates the public about vegetarianism, has defined a "vegetarian" as a person who never eats meat, fish or poultry (9). A vegetarian may also exclude other animal-derived foods from their diet. While these definitions are helpful for those unfamiliar with the topic of vegetarianism, Johnston (10) points out that the term "vegetarian" itself is applied to many novel dietary practices by different people.

The purpose of this study was to investigate what RDs know about the safety, adequacy and health benefits of vegetarian diets and to document the attitudes of RDs concerning vegetarian diets. Another purpose was to report differences in knowledge and attitude that exist between dietitians in different areas of the US.

METHODS AND MATERIALS

American Dietetic Association membership lists of RDs from the state dietetic associations of Vermont, Washington, and Nebraska were obtained. RDs from these three states were chosen to determine if RDs from different geographical areas of the US have varying knowledge and attitudes about vegetarian diets. Twenty percent of the RDs with active membership were selected randomly from each state list using a procedure outlined by Gay (11). The RDs selected received a questionnaire and business-reply envelope by mail. Three weeks after the initial mailing, a follow-up postcard was mailed to all who had not responded. After two more weeks, the data collected was analyzed. There was an overall response rate of 51% (183 out of 358 mailed surveys were returned). Forty-nine percent of the RDs returned surveys from Nebraska, 51 % from Washington, and 58 % from Vermont. This resulted in 10% of the total RDs who are ADA members from each state being surveyed. Gay (11) indicates that a 70% response rate is desirable. Prior to the initiation of the study, a response rate of 30% was deemed acceptable. Because all who were sent surveyed didn't respond, the possibility of a non-response bias is possible and this offers a limitation to this investigation.

A questionnaire was developed for use in this study. A section containing six demographic questions related to educational background, gender, years in practice, and experience with vegetarianism was designed. The responders were asked if they currently or in the past had ever followed a vegetarian diet. The responders were also asked about any continuing education credits they may have acquired about vegetarian diets. The second section was composed of 25 questions designed to assess RDs' knowledge and attitudes of the safety, adequacy and health benefits of vegetarian diets. There were 17 knowledge questions and 8 attitude questions. Questions were phrased positively and negatively to avoid biased responses. Respondents could choose from three possible responses: agree, uncertain, and disagree. An uncertain response was included so that the responder wasn't forced to make a decision they didn't feel comfortable to make. For statistical purposes, an uncertain response was not counted as a correct or positive response and was not further differentiated in the analysis that followed. A knowledge score was determined and presented as a percent of the total possible correct answers. An attitude score was determined and presented as a percent of the total questions answered in a way that presented a positive attitude about vegetarian diets.

Five individuals who were experts in nutrition and vegetarian diets were asked to review the questionnaire and provide feedback concerning content validity and potential effectiveness. They offered recommendations about questions which required modification. A pilot study was conducted with 20 RD's from Yakima, WA who completed the questionnaire. The RD's provided comments and suggestions for clarity and wording of questions. This subset of the RD's in the state of Washington were excluded from those receiving the final questionnaire for analysis. The internal consistency of the final questionnaire was estimated using Cronbach's coefficient alpha (11) and the responses from the pilot study. The alpha calculated for the knowledge questions was 0.75 and for attitude questions was 0.95. The results of a pilot study, combined expert review, and consistency analysis were utilized to format the final questionnaire. Selected questions from the questionnaire may be found in Table 1.

The majority of the data was analyzed using a database created in Microsoft EXCEL Database Program (version 5.0, 1993-1994, Bellevue, WA), while Chi-square analysis was performed on OH!STATS (1994 version, Shupe DR, Central Washington University, Ellensburg, WA). One way analysis of variance was used to determine if significant differences existed between RDs from different regions of the US in overall knowledge or attitude score. Scheffe's and the Bonferroni tests were used to determine which differences contributed to the significance.

Correlation coefficients were determined between attitude and knowledge scores and other selected variables. Independent t-tests were used to analyze differences in mean scores according to responses to demographic questions. Significance was placed at the $P < .05$ level for correlations, ANOVA, independent t-tests and chi-square tests.

TABLE 1
Responses to Selected Knowledge & Attitude Statements: Percent of Subjects from Each State -- Results of Chi-Square Analysis

Statement	Agree			Uncertain			Disagree			χ^2	p
	NE	VT	WA	NE	VT	WA	NE	VT	WA		
KNOWLEDGE STATEMENTS											
2. In general, lacto- and lactoovovegetarian diets for children are similar to pediatric recommendations for reduced chronic disease risk.	**36**	**30**	**30***	31	40	34	33	30	37	1.1	>.25
6. In general, lactovegetarians have been found to have compromised bone densities.	0	0	7	45	20	3	**55**	**80**	**90**	8.0	<.10
14. It is not possible to obtain adequate, quality protein on any type of vegetarian diet.	5	4	1	2	0	1	**93**	**96**	**98**	3.8	>.25
17. A vegetarian soy-based diet can be a successful treatment for the proteinuria and hyperlipidemia associated with nephrotic syndrome.	**29**	**30**	**37**	71	70	57	0	0	6	6.0	>.15
22. Substituting animal-based protein with vegetable protein seems to cause renal changes similar to those obtained by reducing the total amount of protein in the diet.	**21**	**35**	**31**	74	65	65	5	0	4	2.6	>.25
ATTITUDE STATEMENTS											
23. I am not concerned about the nutritional adequacy of most vegan diets.	**10**	**4**	**8**	5	9	7	86	87	86	0.9	>.20
24. I believe that more should be done to encourage people to adopt vegetarian diets.	**24**	**52**	**42**	29	35	27	48	13	31	9.8	<.05

* Percents given in bold correspond to the correct answer for knowledge statements or the answer indicating a positive attitude towards vegetarian diets for attitude statement.
NE: Nebraska; VT: Vermont; WA: Washington.

RESULTS AND DISCUSSION

Mean knowledge and attitude scores were greater for those RDs who were currently or who had previously followed a vegetarian diet than those who had never followed a vegetarian diet (Table 2).

A study with California dietitians indicated that those RDs who had a history of vegetarianism, had a more positive attitude (12). Knowledge and attitudes are linked in many (13-15) nutrition related studies, so it is plausible that vegetarian knowledge is linked to a positive attitude about vegetarian diets.

Attitude and Knowledge scores differed in the three states surveyed. (Table 3). There was a difference in knowledge and attitude about vegetarian diets among RD's in the states sampled. RDs from Vermont had higher overall attitude scores which suggests a more positive attitude towards meatless diets than RDs from Nebraska. There was also a difference between states in overall knowledge scores. The RDs from Washington had significantly higher overall knowledge scores, suggesting that they were more knowledgeable about vegetarianism than the RDs from Nebraska. This suggests that RDs from Nebraska may not be as up-to-date with current information on vegetarianism as the West or East coasts of the US. Perhaps information is not made as readily available to RDs in Nebraska, or they are not taking advantage of recent information available in the area of vegetarian diets to update their knowledge, thoughts, and feelings about them. Knowledge was previously reposrt to be positively correlated with behavior (16). Therefore, it is possible that less knowledge about a topic may affect an individual's behavior in a negative way.

TABLE 2
Mean Knowledge and Attitude Scores Among Vegetarian and Non-Vegetarian RDs: Results of Independent t Tests

		Knowledge	Attitude
Vegetarian Status	n		
Currently Follow Vegetarian Diet			
Yes	14	85 ± 7.0 %[a]	70 ± 20.6 %[b]
No	168	70 ± 14.1 %	55 ± 16.0 %
Have Ever Followed Vegetarian Diet			
Yes	47	78 ± 11.1 %[c]	66 ± 15.3 %[d]
No	133	69 ± 14.3 %	53 ± 15.5 %

[a and b] $P < .01$; RDs who followed vegetarian diets at the time of the study had significantly higher knowledge scores and attitude scores than those RDs who were not following vegetarian diets at the time of the study.

[c and d] $P < .01$; RDs who had ever followed vegetarian diets had significantly higher knowledge scores and attitude scores than those RDs who were not following vegetarian diets at the time of the study.

TABLE 3
Mean Overall Attitude and Knowledge Scores for RDs from Different States and for All States Combined: Results of One-Way ANOVA and Bonferroni Analysis

State	n	Knowledge[a]	Attitude[b]
Nebraska	36	$67\%_{d}$[c]	$52\%_{x}$
Washington	108	$73\%_{e}$	$58\%_{xy}$
Vermont	20	$75\%_{de}$	$63\%_{y}$
All states combined	164	73%	58%

[a]ANOVA - Knowledge: $P < .05$, $F = 3.47$. [b]ANOVA -Attitude: $P < .05$, $F = 3.51$.
[c]Percent scores represent percent of total possible points scored. Maximum score of 100% indicates a strong attitude in favor of vegetarianism or a strong knowledge base related to vegetarianism. d and e , and x and y Subscripts in columns indicate the percentage in that cell is significantly different than the percentage in the cell with a different subscript.

Overall attitude score was found to be positively correlated with overall knowledge score, and negatively correlated with years as an RD. This is similar to findings reported by Strobl (12). There was no correlation between overall knowledge score and years as an RD. (Table 4).

Fifty-five percent of the RDs sampled noted an increase in the number of vegetarians they see as clients. When asked if their education in dietetics had adequately prepared them to deal with vegetarian clients, overall, only 31% of the respondents felt like they were adequately prepared while nearly half (48%) felt they were inadequately prepared although the scores of these individuals did not differ statistically when analyzed. The responses to these statements were not included in the overall knowledge or attitude scores.

TABLE 4
Correlations Between Overall Knowledge, Overall Attitude and Experience For All Respondents Combined

Relationship between:	r^a	p^b
Overall knowledge and attitude score	0.434	<.01
Years as an RD and overall attitude score	-0.181	<.05
Years as an RD and overall knowledge score	-0.090	>.10

r^a = correlation coefficient.
[b]Probabilities for non-directional tests come from Critical Values for Pearson r table.

CONCLUSIONS

Mean knowledge and attitude scores were greater for those RDs who were currently or who had previously followed a vegetarian diet than those who had never followed a vegetarian diet.

There was a difference in knowledge and attitude about vegetarian diets among RDs in different parts of the country. Vermont had the highest knowledge and attitude scores followed by Washington and Nebraska.

There appears to be more vegetarians seeking dietary information from RDs now than in the past, so there are more opportunities for RDs to have a positive impact on vegetarian eating practices. However, less than a third of the RDs sampled felt they were adequately prepared to deal with vegetarian diet questions. Coupled with the negative correlation between years as an RD and attitude score, this indicates that RDs, may require updating in the area of vegetarian dietary practice. A uniform method of vegetarian diet dissemination may help increase the likelihood that RD's are prepared to accurately advise vegetarian clients.

ACKNOWLEDGEMENTS

This research was presented at the Third International Congress on Vegetarianism, March 24-26, 1997 at Loma Linda University, Loma Linda, CA.

REFERENCES

1. Dwyer JT. Health Aspects of Vegetarian Diets. Am J Clin Nutr. 1988;48:712-738.

2. Dwyer JT. Nutritional Consequences of Vegetarianism. Annu Rev Nutr. 1991;11:61-91.

3. Position of The American Dietetic Association. Vegetarian Diets. JADA. *1997;97:1317.*

4. Johnston PK. Counseling the Pregnant Vegetarian. Am J Clin Nutr. 1988;48:901-905.

5. Dwyer JT. Vegetarian eating patterns: science, values, and food choices -- where do we go from here? Am J Clin Nutr. 1994;59(Suppl)1255S-1262S.

6. Fast Facts. Vegetarian Times. 1994;volume:67.

7. Johnston PK. Preface. Am J Clin Nutr. 1994:59(Suppl)vii.

8. Mangels AR. Working With Vegetarian Clients. Issues in Vegetarian Dietetics. 1995;5:1-4.

9. Stahler C. How Many Vegetarians Are There? The Vegetarian Resource Group Asks in a 1994 National Roper Poll. Vegetarian Journal. 1994;13:6-9.

10. Johnston PK. Vegetarians among us: Implications for health professionals. Top Clin Nutr. 1995:10:1-6.

11. Gay LR. Educational Research, Competencies for Analysis and Application. 5th ed. Englewood Cliffs, NJ: Prentice-Hall, Inc.;1996.

12. Strobl CM, Groll L. Professional knowledge and attitudes on vegetarianism: Implications for practice. JADA. 1981;79:568-573.

13. Dobbins MJ, Gates G, Hughes K, Holdt C, Spain J, Slusher B. Biotechnology and Food Safety: Dietetic Professionals' Views on Bovine Somatotropin. J Nutr Ed. 1994;26:69-73.

14. Bagwell JE, Kendrick OW, Stitt KR, Leeper JD. Knowledge and attitudes toward breast-feeding: Differences among dietitians, nurses, and physicians working with WIC clients. J Am Diet Assoc. 1993;93:801-804.

15. Schwenk BA. Dietitians Knowledge, Attitude and Behavior Associated with Very Low Calorie Diets. Ellensburg, WA: Central Washington University; 1994. Thesis.

16. Nutrition education's theoretical foundation. J Nutr Ed. 1985;17 (suppl. 2):S8-S19.

Accepted for publication May 13, 1999.