

The Impact of Nutrition Education on Adolescents : Its Effect on Students' Knowledge, Attitudes, and Behaviors

Hyun-Sook Jang¹

Department of Home Economics, Kyungpook National University, Taegu 702-701, Korea

ABSTRACT

The purpose of this study was to determine the effect of nutrition instruction-using a curriculum guide on nutrition knowledge, attitudes, and food behaviors of students in a junior high school home economics course. We used three instruments to collect data : a nutrition knowledge test, a food and attitude instrument containing four scales, and a two-part food behavior assessment form. A quasi-Solomon four-group experimental design was used. One experimental group was pretested , taught nutrition via the curriculum, and posttested. A second experimental group, which was not pretested, was taught nutrition via the curriculum and posttested. One control group was pretested and posttested, and a second control group was only posttested. Neither control group received food and nutrition instruction until after the study was complete. The results indicate that the experimental group had significantly improved knowledge scores and improved attitude scores on the scale entitled Eating New Foods, Nutrition Affects Health, Caring about Nutrition. Significant changes were observed in posttest scores on the food behavior assessment form. Key findings, useful in understanding the impact of nutrition education on adolescent food choices were that 1) study participants' nutrition knowledge improved, 2) their attitudes toward nutrition became more positive, 3) their intention to include more high-nutrient foods in their diet increased significantly. (*J Community Nutrition* 3(1) : 30-35, 2001)

KEY WORDS : nutrition education · knowledge · attitude · food behavior.

Introduction

Adolescence is a stage in the life cycle characterized by physiological, psychological, and social maturation. As children become adults, they experiment with nutrition practices and acquire nutrition behaviors which may persist for the rest of their lives. Adolescents' nutrition knowledge varies greatly, and is often inadequate (Skinner 1984).

In the research that has been done regarding nutrition attitude, food behavior and nutritional status according to nutrition knowledge of Korean middle school students (Lee et al. 2000), nutrition knowledge of male students is correlated with mother's knowledge, nutrition attitude and nutritional status. On

¹Corresponding author : Jang Hyun Sook, Department of Home Economics Education, Teachers College, Kyungpook National University, Sankyuk Dong 1370 Buk Gu, Taegu 702-701, Korea

Tel : 053) 950-5926, Fax : 053) 950-5924

E-mail : hsjang@knu.ac.kr

the other hand, in female students, nutrient consumption was lowest in subjects whose nutrition knowledge was highest and lowest. Therefore, these results indicate nutrition education and correct information for body image, balanced diet, regularity of meals and food selection for middle school students are required at both school and home. In spite of the recognized need for nutrition education directed to adolescents (Story et al. 1986), studies indicate that a large proportion of secondary school students are not being exposed to nutrition education in depth (Ro 2000 : Lee et al. 2000). Other problems with nutrition education for adolescents are that adolescents dislike the subject of Home Economics, find it boring and irrelevant to their lives. However, nutrition education, begun at home and in elementary school and continued in junior and senior high school, has potential for motivating nutritious food choices (Lewis et al. 1988).

In spite of the overcrowded curriculum and the focus on the Korean Scholastic Aptitude Test (SAT) subjects in today's schools, reaching adolescents in

school with a nutrition education curriculum designed to be integrated into existing Home Economics education is a viable solution to an alternative of no nutrition education.

There is an apparent need for well-developed curricular guides that meet the needs of students. In response to this need, we developed curricular guides which incorporated concepts and instructional objectives identified by nutrition educators.

This study was conducted to examine the impact of nutrition education using this guide: changes in nutrition knowledge, attitudes and food-choice behavior of junior high school students.

Subjects and Methods

1. Participants

Junior high school students in grades 8 who were attending Dong-Do Girls' Junior High School and Duk-Won Boys' Junior High School in Taegu participated in this study. The number of the subjects in this study were 475. This study was done from September 10, 2000 to November 10, 2000.

2. Implementation of the study

We used a quasi-Solomon four-group experimental design (Campbell 1963). The design was quasi because random assignment to experimental or control groups was not possible. Rather, entire classes were assigned to either the experimental or control group, depending upon when they had previously been scheduled for nutrition education. Those who were scheduled for such instruction during the study period comprised the experimental group and the remainder the control group. The topics of nutrition education were major and minor nutrients, ideal body weight and sensible weight control, and adequate iron & calcium intake.

Of the two control groups, one group served only to assess the effect of pretesting on students posttest performance, that is, the students in this group were posttested but not pretested and were not taught nutrition until after the experiment was completed. The other control group was both pretested and posttested with no intervening food or nutrition edu-

cation. One of the experimental groups was pretested, taught nutrition via our curriculum guide, and then posttested. The other experimental group was not pretested but was taught nutrition via our curriculum guide and then posttested.

3. Instruments

The focus of this article was the examination of change in students' nutrition knowledge, attitude, and behavior. To assess changes in students, we used a nutrition knowledge test, a nutrition attitude instrument and food behavior assessment form.

4. Knowledge test

To assess nutrition knowledge, we constructed multiple-choice test items for each instructional objective. Based on recommendations by a panel of 5 experts in nutrition education who reviewed the initial draft of the instrument, revisions were made. We pilot-tested the revised knowledge test with junior high school students not involved in the study ($n = 20$): we then item analyzed the results and further refined the instruments. The final knowledge instrument contained 70 items. The Kuder-Richardson 20 reliability coefficient (Gronlund 1985) for the knowledge test administered to students participating in the study was 0.85.

5. Attitude scales

We used a Likert-type attitude instrument to assess students' attitudes about four constructs titled: *I am interested in learning about nutrition.*, *I like to eat new foods.*, *I believe nutrition affects health.*, and *I care about nutrition.*

The statements reflecting each construct served as the scale for examining each attitude, and the titles were abbreviated as follows: *Learning about nutrition*, *Eating new foods*, *Nutrition affects health*, and *Caring about nutrition*. The attitude instruments used in this study was validated in previous research (Bredbenner 1984). The Cronbach alpha reliability coefficients for the four scales in this study were 0.67, 0.81, 0.63, and 0.84, respectively.

Some statements were worded negatively, and statements from each construct were mixed throughout the instrument. Students indicated their agreement with each statement by indicating whether they st-

rongly agreed, agreed, were uncertain, disagreed, or strongly disagreed. The direction of each item was considered during scoring. For example, a response of "strongly disagree" for negatively worded statements and "strongly agree" for positively worded attitude statements both received a score of 5. We calculated a mean score for each scale by summing the scores for the statements in a scales and dividing by the number of statements in the scale. Mean scores could range from 5(strongly positive) to 1(strongly negative).

6. Food-choice behavior

We used a two-part food behavior form to assess dietary behavior. The first part of food behavior assessment form was a food frequency form designed to evaluate dietary behavior. Students indicated on the form how frequently they consumed certain types of food. The form included 5 food groups: milk & dairy products; meat & protein foods; fruits & vegetables; breads & cereals; candy, snack foods, soft drinks & coffee(low nutrient density food). A 5-point scale, ranging from *hardly ever*(1 points) to *three or more times a day*(5 point), indicated the frequency of food consumption. The second part of the food behavior assessment form focused on food choices. This instrument was adapted from existing instruments(National Dairy Council 1985). Students were asked to choose one of the following responses for each 20 foods: A) a food I have never eaten or heard of; B) a food I like and eat; C) a food I like but try not to eat too often; D) a food I do not like but will eat or E) a food I refuse to eat. The 20 foods in this part of the food behavior assessment were grouped into five food categories: milk and dairy products(2 food items); fruits and vegetables(6 food items); protein foods (4 food items); breads and cereals(2 food items); and low nutrient density foods(6 food items). These five food categories were scored using the schema described in Table 1. For each of five food categories, we computed a score for the following scale: *Acceptance*(student has eaten the food and will continue to eat the food); *Exposure*(student has eaten the food); *Low Risk Taking*(student has never eaten the food); and *Selective Avoidance*(extent to which student will avoid the food).

Table 1. Scoring schema for food behavior assessment from part 2 - food choices

Scale	Score awarded to response ¹					
	A	B	C	D	E	O ²
Exposure	0	1	1	1	1	0
Acceptance	0	1	0	1	0	0
Low risk taking	1	0	0	0	0	0
Selective avoidance	6	0	4	0	6	3

¹Responses: A = Food I have never eaten or heard of; B = Food I like and eat; C = Food I like but try not to eat too often; D = Food I do not like but will eat; E = Food I refuse to eat
²O = Omit. No response was given by the student to the item

Analysis of variance on the posttest scores was used to determine whether pretesting affected posttest performance. Analysis of covariance, with pretest scores serving as covariates, determined the effect of nutrition education on knowledge, attitude, and dietary behavior. The analysis of covariance generated posttest scores adjusted for variation in pretest scores.

Results

The knowledge, attitude, and food behavior posttest scores of the nonpretested control group did not significantly differ from posttest scores of the pretested control group, nor did the posttest scores of the nonpretested experimental group differ significantly from the posttest scores of the pretested experimental group. This finding indicates that pretesting did not affect posttest scores.

Table 2 contains the adjusted mean knowledge posttest scores for the experimental group and for the pretested control group. The data indicate that the experimental group achieved a significantly higher adjusted mean knowledge posttest score.

As Table 2 shows the adjusted mean attitude post-scores of the experimental group on the attitude scale differed significantly from those of the control group. The adjusted mean posttest scores of the experimental group on the scale *Eating new foods, Nutrition affects health* and *Caring about nutrition* were significantly higher than those of the control group, indicating that the students were positively inclined toward eating new foods and felt it was important to pay at-

tention to their diets. The significant high adjusted mean postscore on the scale *Learning about nutrition* indicated they wanted to receive nutrition information

Table 2. Adjusted mean posttest scores¹ of students on knowledge, attitude, and food behavior assessment form part 1

Instrument	Experimental group	Control group
	Mean ± SE	Mean ± SE
Knowledge ²	45.65 ± 0.45***	29.78 ± 0.40
Attitude scales ³		
learning about nutrition	3.05 ± 0.15	3.00 ± 0.25
eating new foods	4.20 ± 0.28**	3.95 ± 0.32
nutrition affects health	4.50 ± 0.14***	3.20 ± 0.28
caring about nutrition	4.10 ± 0.50**	3.18 ± 0.45
Food behavior ⁴		
milk & dairy products	3.45 ± 0.25**	2.45 ± 0.45
meat & protein foods	3.89 ± 0.30	3.56 ± 0.31
fruits & vegetables	3.89 ± 0.51**	2.84 ± 0.25
breads & cereals	3.02 ± 0.56	3.25 ± 0.36
low nutrient density foods	3.21 ± 0.20	3.25 ± 0.46

¹p < 0.05, **p < 0.01, ***p < 0.001

²Mean scores generated from analysis of covariance are adjusted for variation in prescores.

³On the knowledge test, the maximum score was 70; n = 240 for the experimental group, and n = 235 for the control group.

⁴Scores for each attitude scale ranged from 1 (strongly negative) to 5 (strongly positive); n = 235 for the experimental group and n = 225 for the control group.

⁵Scores for each food grouping ranged from 1 (hardly ever consumed) to 5 (consumed 3 or more times per day); n = 240 for the experimental group and n = 235 for the control group.

or education.

The results of the first part of the food behavior assessment form (food frequency) indicates that the mean postscore of the experimental group showed higher scores than did the control group for the milk & dairy products category and the fruits & vegetables category.

Table 3 shows the students' adjusted mean post-scores on the second portion of the food behavior assessment form. The high adjusted mean postscores on the scales *Exposure* and *Acceptance* for fruits & vegetables, breads & cereals, meat & protein foods, and milk & dairy products indicate that students were familiar with and intended to continue to eat these foods. The low adjusted mean postscore on the scale *Acceptance* for low nutrient density foods and high adjusted mean postscore for the scale *Selective Avoidance* indicate that the students were trying to decrease their intake of such foods.

There were no food categories from which students had never eaten, as indicated by the extremely low adjusted mean postscores for the scale *Low Risk Taking* across all five food groupings. The adjusted mean postscore of the experimental group on the scale *Acceptance* for the fruit and vegetable category and *Selective Avoidance* for the low nutrient density

Table 3. Adjusted mean posttest¹ scores of students on food behavior assessment form part 2—food choices

Scale	Milk & dairy products	Meat & protein foods	Fruits & vegetables	Breads & cereals	Low nutrient density foods
	Mean ± SE	Mean ± SE	Mean ± SE	Mean ± SE	Mean ± SE
Exposure					
Experimental	2.45 ± .085 ²	3.72 ± .025	3.78 ± .052	3.56 ± .023	5.65 ± .023
Control	2.00 ± .025	3.69 ± .035	3.54 ± .025	3.25 ± .026	5.89 ± .030
Acceptance					
Experimental	2.52 ± .060**	2.98 ± .034	4.52 ± .015*	2.44 ± .070	0.12 ± .010
Control	2.20 ± .026	2.75 ± .010	3.25 ± .026	2.55 ± .020	0.12 ± .030
Low risk taking					
Experimental	0.03 ± .010	0.05 ± .020	0.08 ± .010	0.03 ± .020	0.01 ± .010
Control	0.01 ± .020	0.05 ± .010	0.08 ± .020	0.03 ± .010	0.01 ± .020
Selective avoidance					
Experimental	2.82 ± .126	3.54 ± .125	8.45 ± .120	2.45 ± .123	13.54 ± .351**
Control	2.79 ± .110	3.85 ± .130	9.45 ± .141	2.50 ± .126	11.29 ± .345

**p < 0.05, **p < 0.01

¹Mean scores generated from analysis of covariance are adjusted for variation in prescores. The maximum food choice scores for the Exposure, Acceptance and Low risk-taking scales are 6, 2, 4, 2 and 6 for fruits & vegetables, breads & cereals, meat & protein foods, milk & dairy products, and low nutrient density foods, respectively. For the Selective avoidance scale, the maximum scores are 36, 12, 24, 12, and 36, respectively; n = 240 for the experimental group and n = 235 for the control group.

²Mean ± SE

food category differ significantly from the control group (Table 3).

Discussion

Adolescence is a period of transition from childhood to adulthood, with a broad spectrum of biological changes, i.e., rapid growth in height and weight, alteration in body composition, and sexual maturation. It is important to understand these basic changes in order to plan nutrition education strategies effectively for this age group. Also, adolescence is a period of changing attachment to family, with greater family control early in adolescence and greater independence by the end of adolescence. Thus peer influence, some adolescent behavior and sometimes share their concerns with each other before adults. Also the mass media include many advertisements: most adolescents spend a good deal of time watching television and listening to the radio, and the media influences their nutritional beliefs and practices. But school health education classes can consider the nutritional concerns of adolescents as part of their nutrition education curriculum. School-based health and nutrition instructions offer one means of addressing the health risks of adolescents. School programs have proven to be particularly beneficial for overweight adolescents. Although adolescent obesity is difficult to treat, school programs have had some measured success. Intervention that includes nutrition education, behavior modification, and physical activity has led to a decrease in percent overweight.

Positive behavioral change is the ultimate goal of most nutrition education for adolescents, although such change often is not assessed or not significant (Shannon et al. 1988). Typically, evaluation of school-based nutrition education programs report knowledge gains and/or attitude changes but not behavior change (Johnson & Johnson 1985). Story and Resnick (1986) commented, "There is a need for intervention programs for adolescents that focus on behavior changes rather than acquisition of knowledge".

In recent studies (Ku et al. 2000; Ro 2000; Lee et al. 2000), systematical educational programs need to be developed for elementary and junior high schools.

These should include information about achieving a balanced diet, good eating habits, meal management and Korean dietary culture. And also, nutrition education at home and school must be emphasized.

Findings from this study indicated that students made gains in knowledge about nutrition, became more positive in their attitudes toward nutrition, and showed evidence of altering their eating behavior in positive directions. The most interesting thing to nutrition educators is the last finding, that is, altering their eating behavior in positive directions.

As mentioned above, the ultimate goal of nutrition education is to develop healthy, nutritious food-choice behaviors, nutrition education programs that show positive food behavior change are requisite. In this study, students reported desirable changes in eating behavior: that is, they were willing to eat foods higher in nutrient density. This study shows that nutrition education, when appropriately supported, can begin to bring about positive food choices in teenagers.

In this study we did demonstrate a positive influence of the educational program on the attitude scales. Statements on the scale, *Nutrition Affects Health* focused on personal growth and development and were more closely related to the students' than were the other three attitude scales. In addition, outcomes of other studies indicated that when adolescents perceive as directly related to their personal health they tended to respond more positively to nutrition education (Bredbenner 1988; Lee et al. 2000; Ro 2000). The adjusted mean post-scores for the attitude scales *Eating New Foods* and *Caring about Nutrition* indicated positive feelings by the experimental group.

The only attitude scale in which students in both groups reported undecided feelings was *Learning about Nutrition*. This finding supports previous research which indicated that middle school students had a low level of interest in learning about nutrition. Also, the undecided feelings toward learning about nutrition may be due to students' not having developed a sense of their need for, and the usefulness of nutrition.

Key findings useful in understanding the impact of nutrition education on adolescent food choices were that 1) study participants' nutrition knowledge improved, 2) their attitude toward nutrition became more

positive, and 3) their intention to include more high-nutrient foods in their diet increased significantly. Results of this study indicate that the behavior change is successful with adolescents in a school-based setting. Thus, our findings suggest that nutrition education for adolescents can be effective through school-based Home Economics Education.

Conclusion

To determine the effect of school-based nutrition education for adolescents, we examined changes in nutrition knowledge, attitudes and food-choice behavior of junior high school students in study of nutrition education integrated into home economics. The outcome of this study, i.e., improvement of nutrition knowledge, attitude and food behavior scores, are similar to other nutrition curriculum evaluation studies. Our findings, useful in understanding the impact of nutrition education on adolescent food choices were that 1) study participants' nutrition knowledge improved, 2) their attitude toward nutrition became more positive, and 3) their intention to include more high-nutrient foods in their diet increased significantly.

In our opinion, school-based nutrition education best serves students when it provides them with a comprehensive understanding of nutrition, so they can be informed decision makers when they do have control over their diet- at present or in the future. We further believe that knowledge-gain is likely the most immediate outcome of such education, with changes in attitude and dietary behavior more distal and not so readily in the short term.

References

- Bredbenner BC, Connell LO, Shannon B, JM Eddy(1984) : A Nutrition curriculum for health education. *J School Health* 54 : 385-388
- Gronlund NE(1985) : Measurement and evaluation in teaching. New York : Macmillan Publishing Co., Inc, pp.540
- Johnson DW, RT Johnson(1985) : A meta-analysis and synthesis of nutrition education research. *J Nutr Educ* 17(2 Supp) : S 11-S19
- Ku Pok-Ja, Lee Kyung-Ae(2000) : A survey on dietary habits and nutritional knowledge for elementary school children's nutritional knowledge. *Kor J Diet Culture* 15(3) : 201-213
- Lee Sung-Woong, Sung Chung-Ja, Kim Ae-Jung, Kim Mi-Hyun (2000) : A Study on nutritional attitude, food behavior and nutritional status according to nutrition knowledge of Korean middle school students. *Kor J Comm Nutr* 5(3) : 419-431
- Lewis M, J Brun, H Talmage, S Rasher(1988) : Teenagers and food choices. *J Nutr Educ* 20 : 336-340
- National Dairy Council(1985) : The food choice inventory-A test of food behavior for students for junior and senior and adults. A publication of the National Dairy Council and the University Illinois at Chicago. Rosemont, IL : National Dairy Council, 1985, pp.10.
- Ro Hee-Kyung(2000) : Comparison of nutrient intakes, dietary behavior and perception about body image between adolescent boys and girls in a rural area. *Kor J Comm Nutr* 5(2s) : 280-288
- Shannon B, A Chen(1988) : A three-year school-based nutrition education study. *J Nutr Educ* 20 : 114-124
- Shoaf LR, PD McClellan, KA Birkovich(1986) : Nutrition knowledge, interests and information sources of male athletes. *J Nutr Educ* 18 : 243-245
- Skinner JD(1984) : Nutrition knowledge of teenagers. *J School Health* 54 : 71-74
- Skinner JD, MJ Woodburn(1983) : Nutrition-related characteristics of high school teachers and student performance. *J Nutr Educ* 15 : 99-104
- Story M, MD Resnick(1986) : Adolescents : views on food and nutrition. *J Nutr Educ* 18 : 188-192