

Evaluation of Nutrition Education for Insulin Dependent Diabetic Students

Lee, Jung Hee · Park, Dong-Yean* · Yoon, Jin-Sook

Department of Food and Nutrition, Keimyung University, Daegu, Korea
Department of Home Economics Education, Dongguk University, Kyongju, Korea*

ABSTRACT

This study was conducted to evaluate changes in nutritional knowledge, attitudes, behavior intention and behavior in a sample of 27 insulin dependent diabetic students participating in diabetics' camp. Nutritional knowledge related to diabetes, attitudes toward diabetes treatment and behavior intention about dietary changes were tested before and after nutrition education. Six months after nutrition education, an open-ended questionnaire about their actual behavior changes was mailed to all participants and 17 of them responded. Pre-and post-testing showed that nutrition education was effective in significant changes in knowledge and in promoting positive attitudes and behavior intention. Increases of knowledge were consistently the same regardless of sex, level of education, regularity of diet, and duration of disease. Compared to male students, female students showed more positive change in knowledge, attitudes and behavior intention. It also appeared that middle school students showed more positive improvement in knowledge, attitudes and behavior than elementary and high school students. A follow-up test showed that their actual behavior changes were not squared with their behavior intention. They pointed out difficulties in having proper amount of meals and snack and the conflict with school time schedule as the major reason for discordance. These findings suggest that nutrition education for diabetics can be effective to improve their knowledge, attitudes and behavior intention and understanding about barriers to behavior change is important for better compliance to the disease.

KEY WORDS : nutrition education · diabetes mellitus.

Introduction

Nutrition education for patient is an important part of quality health care, particularly in the area of diabetes. While many clinics and nutritional programs have offered nutrition education for diabetic adults

Accepted : November 20, 1995

and children¹⁻³⁾, evaluation of the effect of the nutrition education are relatively less active^{4,6)}. For the diabetic students, several diabetes camps have held during summer vacation. The camp for diabetic students gives attendants a good opportunity to have fun camping and also learn about managing their disease during camp. However, the effect of nutrition education in camp has not been fully investigated in Korea.

Therefore, this study was conducted to evaluate the nutrition education for insulin dependent diabetic students who attended diabetes camp.

Research questions of this study were to reflect changes in knowledge, attitudes and behavior intention about diabetes and nutrition which occurred for campers during the camp. The other questions were whether nutrition education helps students for management of diet and what were the barriers to behavioral change.

Methods

1. Subjects

The camp was held for six days, August 8-13 in 1994. Several doctors in Daegu recommended their patients to attend camp and several hospitals put the advertising poster on the bulletin board to recruit diabetic students. We tested 27 students who attended the Daegu Diabetes Camp. Nine of them were male students and 18 were female students. Nine of 27 students were in elementary schools, 10 were in middle schools and 8 were in high schools.

2. Procedure

1) Pre-test

One week before the camp, we pretested campers with structured questionnaires. The questionnaires were selected from literature¹⁾⁷⁾⁸⁾ or developed by us based on our previous experience from nutrition counseling during diabetic camp or diabetic nutrition classes. They were consisted of the knowledge test about diabetes and nutrition ; attitudes test about the importance of nutritional management ; behavior intention about dietary changes and general information about the campers.

2) Nutrition education

Nutrition education was given by three dietitians and four assistants. Lectures were given in the two groups divided in elementary school students group and middle and high school students group. Individual guidance was given for selection of food in ac-

cordance with their energy needs whenever they ate meals and snacks during the camp.

Four concept maps⁹⁾ were used for nutrition education by dietitians and students played game with these maps while dietitians evaluated students' understanding about the content of education. These concept maps were posted on the wall all the time during the camp in order that campers could look at them. Nutrition education covered the understanding of the role of food and hormone for maintenance of blood glucose, role of five major nutrients, importance of diet therapy, six food groups and food exchange unit for proper selection of food. A cooking contest was held for students to enhance the ability for preparing food by themselves.

3) Post-test

Post-test was given to campers with the same questionnaires as those for the pre-test on the last day of camp.

4) Follow-up test

Open-ended questionnaires were mailed to all camp participants six months after nutrition education. Eleven out of 27 were responded. When telephone calls were made to the rest of them, six of them responded by phone. Questionnaires consisted of the questions about whether nutrition education in camp helps them in their management of diet, whether they used food exchange units, and what were the barriers to behavioral change.

3. Data analysis

1) Measurement and scoring

a. Knowledge test

Nutritional knowledge related to diabetes was measured by 10-item-multiple-choice knowledge test both in pre-test and post-test. The test included general questions about nutrition, food groups and exchange unit, role of insulin in maintenance of blood glucose, snack for diabetes etc. The score 1 was given to correct answer, so possible range of scores was 0 to 10.

b. Attitudes test

Attitudes toward the importance of nutritional management was assessed using six item attitude scale. Attitudes tests included : attitude toward the importance of diet therapy, need to get information on diabetic management, necessity of balanced nutrition, self-regulation to overcome diabetes, role of nutrition counseling and overall attitude toward diabetes. Responses were based on a five-point Likert scale and were scored 1 to 5 representing the highest level of agreement. Reliability measured by Cronbach's alpha was .58 for the pre-test and was .81 for the post-test. Possible range of scores was 6 to 30.

c. Behavior intention

Behavior intention about dietary changes were tested using 9 item behavior intention scale. Questions for behavior intention included : 1) willingness to adjust food intake to energy requirement 2) intention to change dietary habit for diabetic management 3) willingness to keep the same amount of food intake at parties 4) willingness to eat unfamiliar foods for better health 5) intention to use food exchange table in everyday life 6) willingness to select food items from every food group 7) willingness to keep meal time regularly 8)willingness to adjust snacks to the amount of exercise 9) willingness to ask nutrition counseling. Responses were based on a five-point Likert scale and scored 1 to 5 representing the highest level of intention. Reliability measured by Cronbach's alpha was .83 for the pre-test and .80 for the post-test. Possible range of scores was 9 to 45.

2) Data analysis

All statistical test in this study were performed using the SPSS-PC. Paired t-test was used to compare the difference between pre-test and post-test.

Results

1. Clinical characteristics

a. Duration of disease

Mean duration of disease was four years. Ten out

of 27 had the disease less than three years and 17 had disease for four or five years.

b. Type of treatment in diabetic students

Almost 90% of students were treated by insulin and three students were treated by hyperglycemic agent or diet therapy alone.

c. Type of complication

Three students had diabetic retina and four students had a diabetic neurosis.

d. Regularity of diet

Eighteen out of 27 had regularity in diet and 9 had irregular diet habits.

2. Knowledge difference

The difference of knowledge score between pre-test and post-test was shown in Table 1. Mean knowledge score for the pre-test was 4.6 and it increased significantly up to 6.9 in the post-test as a whole. As shown in the Table 2, the knowledge scores were consistently increased regardless of sex, level of education, regularity of diet, and duration of disease. Compared to pre-test, more significant gains in nutrition knowledge were seen for such items as appropriate snacks to prevent hypoglycemia, ideal distribution of energy to carbohydrate, protein and fat intake.

3. Attitudes difference

As shown in the Table 1, as a whole, the mean score of attitudes for the pre-test was 25.0 and it was significantly increased up to 26.1 in the post-test. However, if investigated in subgroups, as shown in Table 3, the attitudes scores were significantly increased only in the group of female, 1 to 3 years in the duration of disease and in the middle school group.

4. Behavior intention

The scores of the behavior intention were shown in

Table 1. Means and standard deviation at pre and post-test for whole subjects

Variable ok	Pre-test	Post-test
Knowledge	4.6 ± 1.4	6.9 ± 1.3**
Attitude	25.0 ± 2.8	26.1 ± 3.3*
Behavior intention	33.8 ± 5.1	37.3 ± 4.4**

**p < .001 *p < .01

Nutrition Education for IDDM Students.

Table 2. Mean knowledge scores at pre and post-test for subgroups

Variable		N	Pre	Post
Sex	Male	9	4.9 ± 2.0	7.0 ± 1.6**
	Female	18	4.4 ± 0.9	6.9 ± 1.2**
Duration of Disease	1-3 Years	10	4.7 ± 1.3	7.0 ± 1.6**
	4-5 Years	17	4.5 ± 1.4	6.9 ± 1.2**
Education	Elementary School	9	4.0 ± 1.1	5.9 ± 1.4*
	Middle School	10	4.6 ± 0.8	7.4 ± 1.0**
	High School	8	5.3 ± 1.8	7.5 ± 1.1*
Diet Habits	Regular	18	4.5 ± 1.3	6.7 ± 1.3**
	Irregular	9	4.8 ± 1.4	7.3 ± 1.3**

**P < .001 *P < .005

Table 3. Mean attitude scores at pre and post-test for subgroups

Variable		N	Pre	Post
Sex	Male	9	24.7 ± 4.1	25.4 ± 4.5
	Female	18	25.1 ± 2.0	26.4 ± 2.6*
Duration of Disease	1-3 years	10	24.9 ± 1.6	26.9 ± 2.5*
	4-5 years	17	25.0 ± 3.4	25.6 ± 3.7
Education	Elementary School	9	25.0 ± 3.2	24.9 ± 3.7
	Middle School	10	24.2 ± 1.8	26.1 ± 3.0*
	High School	8	25.9 ± 3.4	27.5 ± 3.1
Diet Habits	Regular	18	25.3 ± 3.2	26.1 ± 3.5
	Irregular	9	24.2 ± 1.7	26.1 ± 3.1

*P < .05

Table 4. Mean behavior intention scores at pre and post-test for subgroups

Variable		N	Pre	Post
Sex	Male	9	33.0 ± 3.3	36.2 ± 4.9
	Female	18	34.2 ± 5.8	37.8 ± 4.1**
Duration of Disease	1-3 years	10	35.4 ± 7.3	38.3 ± 4.2
	4-5 years	17	32.8 ± 3.1	36.7 ± 4.5**
Education	Elementary School	9	36.2 ± 5.0	37.4 ± 5.1
	Middle School	10	32.6 ± 6.0	36.8 ± 3.6**
	High School	8	32.5 ± 3.3	37.8 ± 4.9*
Diet Habits	Regular	18	33.2 ± 4.8	36.8 ± 4.4**
	Irregular	9	34.9 ± 5.8	38.2 ± 4.5

**P < .01 *P < .05

Table 1. The mean score of behavior intention for pre-test was 33.8 and it was 37.3 for the post-test. The score of behavior intention was significantly increased after nutrition education. However, if investigated in subgroup, as shown in Table 4, the score of behavior intention was significantly increased only in the groups of female, the group of 4 or 5 years duration

of disease, group of junior middle school and high school, and in the group with regular diet habits.

5. Behavior

The open-ended responses of follow-up questionnaire was evaluated and their responses were grouped into several categories. About 81% (13 stu-

dents) of respondents collaborated that the nutrition education helped them to manage diet for diabetes. Ten students responded that they could have proper amount of energy in accordance of their energy needs. Three students responded that they could have proper amount of snacks in case of hypoglycemia and in accordance with the amount of exercise. Two students responded that they could have balanced diet using food groups. Another two students responded that they were able to use food exchange units.

The respondents pointed out several difficulties in practice. Eight students pointed out the difficulty in having proper amount of meals and snacks. Five students responded that they had difficulties in keeping time for meals and snacks. Another three students pointed out that they had difficulties in calculating energy when they ate out.

Discussion

Nutrition education during camp was effective in significant changes in knowledge and in promoting positive attitudes and behavior intention. Increases of knowledge were consistent regardless of sex, levels of education, regularity of diet, and duration of disease. However, attitudes and behavior intention were not consistent in the all subgroups. It may mean that nutritional education was emphasized on the knowledge domain or it was not enough to promote changes in attitude and behavioral intention.

Another reason can be considered that it is more difficult to change in attitude and behavior intention. When considered alone, knowledge seldom predicts behavior change. Therefore several models, including the Theory of Reasoned Action and the Health Belief Model⁽¹⁰⁾, emphasize that attitudes, social relationships, and beliefs are important factors for changing of health behavior. A study about dietary education of elderly diabetic patients⁽¹¹⁾ showed that subjective norm was the strong statistical predictor of dietary adherence. Identifying referent others may improve the success of efforts to modifying behavior. If the diabetes educators identify negative or erroneous beliefs

that can lead to a negative attitude toward dietary adherence, they can improve the education. Therefore, discussion and education should focus on ways to change these beliefs and improve the attitude towards dietary adherence.

Several studies⁽¹²⁻¹⁵⁾ emphasized that parent involvement in nutrition education and family intervention in order to improve eating behavior. Parents are considered to have much influence on their children's attitudes, subjective norm, and motivation of diet changes. They also strongly influence children's eating patterns by modeling, positive reinforcement, exposure to foods, discipline are related to children's food behaviors. So, parents must be included in nutritional education programs.

Group of female and middle school students had shown significant increase in all areas. It can be assumed that female students were much more familiar to food and nutrition because of sex role or curriculum of girl's school compared to male students⁽⁹⁾. Middle school students are in puberty and they might have much more motivation and eagerness for solving their problems. Therefore, the age of middle school students may be the best time for education.

Considerable number of students responded that they had difficulties to consume the right amount of meals and snacks. Therefore, education should give them many opportunities to practice appropriate selection of food to meet their energy needs. Some students pointed out that the difficulties in keeping snack times at school and in calculating energy when they ate out. Therefore, education should give opportunities to discuss the ways how to cope with the socio-environmental situation.

Conclusion

Several limitations of the study needed to be considered when interpreting the findings. First, a larger sample size is necessary to have sufficient statistical power to generalize the results. Second, the control group or two times pre-test before the nutrition education was needed to evaluate true educational effect.

Nutrition Education for IDDM Students.

However, the results of this study support that nutrition education for diabetic students was effective to increase their knowledge, to enhance positive attitudes, and to promote desirable behavior intention and behavior. This study also suggest several ways to improve the effect of nutrition education : parent involvement, discussion about the barriers to behavior change, discussion about the ways to cope with socioenvironmental situation must be included in nutrition education in order to improve the effect of nutrition education.

Literature cited

- 1) MY Na. On Site Nutrition Education for Diabetes (Buffet, Camp). *Diabetes* 17(supplement) : 37-40, 1993
- 2) ML Wheeler and E. Warren-Boulton. Diabetes Patient Education Programs. *Diabetes Care* 15(Supplement) : 36-40, 1992
- 3) RR Rubin, M. Peyrot and CD Saudek. Differential Effect of Diabetes Education on Self-Regulation and Life-Style Behaviors. *Diabetes Care* 14 : 335-338, 1991
- 4) SJ Moon et al. Measurement of Nutrition Counseling Effects for Diabetes Mellitus Patients. *Korean Journal of Nutrition* 27(10) : 1070-1077, 1994
- 5) RR Rubin. Differential Effect of Diabetes Education on Self-Regulation and Life-Style Behaviors. *Diabetes Care* 14(4) : 335-338, 1991
- 6) M Franz. Attitudes Toward Dietary Management of Diabetes among Diabetic Youngsters at Camp. *The Diabets Educator Spring* : 30-33, 1981
- 7) SR Williams. Nutrition and Diet therapy. 5th edition Mosby College Publishing.
- 8) M Lewis et al. Teenagers and Food Choices : The Impact of Nutrition Education. *Journal of Nutrition Education* 20 : 336-340, 1988
- 9) JD Novak and DB Gowin. Learning How to Learn. 40-54, 1989
- 10) K Glanz et al. Health Behavior and Health Education : Theory, Research and Practice. 39-91, 1990
- 11) KM Chapman et al. Applying Behavioral Models to Dietary Education of Elderly Diabetic Patients. *Journal of Nutrition Education* 27(2) : 75-79, 1995
- 12) TA Nicklas et al. "Heart Smart" Program : A family Intervention Program for Eating Behavior of Children at High Risk for cardiovascular Disease. *Journal of Nutrition Education* 20(3) : 128-132, 1988
- 13) BA Kirks and C Hughes. Long-Term Behavioral Effects of Parent Involvement in Nutrition Education. *Journal of Nutrition Education* 18(5) : 203-206, 1986
- 14) BA Kirk et al. Parent Involvement in Nutrition Education for Primary Grade Students. *Journal of Nutrition Education* 14(4) : 137-140, 1982
- 15) DG Schlundt et al. Situational Obstacles to Dietary Adherence for Adults with Diabetes. *Journal of the American Dietetic Association* 94(8) : 874-879, 1994

Lee, Jung Hee · Park, Dong-Yean · Yoon, Jin-Sook

= 국 문 초 록 =

인슐린 의존성 당뇨병 학생을 대상으로 실시한 영양교육의 효과

이정희 · 박동연* · 윤진숙

계명대학교 가정대학 식생활학과, 동국대학교 자연과학대 가정교육학과*

당뇨 캠프에 참여한 27명의 인슐린 의존성 당뇨병 학생을 대상으로 영양교육을 실시한 후 그 효과를 평가하였다. 영양교육 실시 전후 당뇨에 관한 영양지식, 당뇨치료에 대한 태도, 식사행동 변화(dietary change)에 대한 행동의도(behavior intention)를 설문지를 이용하여 조사하였다. 또한 영양교육 실시 6개월 후 개방형 설문지를 이용하여 실제 행동변화에 대해 조사하였다. 조사 결과 학생들의 영양지식, 태도, 행동의도는 영양교육을 받은 후 유의적으로 증가하였고, 특히 영양지식은 성별, 교육수준, 식습관의 규칙성, 질병기환에 관계없이 유의적으로 증가하였다. 지식, 태도, 행동의도의 전 영역에서 여학생은 남학생보다 더 긍정적인 증가를 보였으며, 중학생이 국민학생, 고등학생에 비해 더 긍정적인 증가를 보였다. Follow-up test 결과 학생들은 행동의도를 실제 행동으로 실천하는데 어려움이 있음을 지적하였다. 학생들은 식사와 간식을 먹을 때 적절한 양을 선택하는 것과 학교수업시간에 식사및 간식 시간을 조정하는 것이 가장 힘든 부분임을 지적하였다. 본 연구는 영양교육이 학생들의 지식, 태도, 행동의도에 긍정적인 효과를 가져오며, 교육효과를 높이기 위해서는 식사행동 변화에 장애가 되는 요인에 대한 이해가 필요함을 강조한다.