

The Effect of Health and Nutrition Management Classes on Nutrition Choices: A Case Study on Diabetics in Huntsville, Alabama, United States

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ABSTRACT

This study evaluated the effectiveness of a one-day nutrition education seminar utilizing a sample of 26 confirmed diabetics who had at least once before, participated in nutrition classes. The participants were exposed to a seminar that promoted, evaluated, and rewarded good nutrition choices in an effort to educate this group about coping with diabetes through nutrition management. A 24-hour food recall was used as a pre-test, meal plans constructed by trained graduate-level diet interns were used as the standard by which proper nutrition was judged, and participants' choices were used as the post-test evaluation. Significant differences were found between the 24-hour recall and the ideal meal plans in all of the three nutrient measured (energy, protein and fat). Participants showed a preference for personally constructed meal plans as opposed to those constructed by the interns. However, significant diet adjustments were shown in the short term. Discussion focused on the need for repeated involvement in diet interventions, and the challenges faced in changing diet habits of a group of middle-aged individuals who are even slightly obese.

INTRODUCTION

With the rapid advance of modern communication technologies there is a corresponding rise in awareness of the connection between diet and many chronic diseases including diabetes. The internet has been the leading medium in this advance. In order to further extend the effect of new technologies, health specialists are moving beyond this broad medium, and are exploring media that can more specifically target persons who are at-risk and actually suffering from diabetes, with information that would empower them with informed action against this disease (Kurtzweil, 1994; Mac, Phillips & Stanek, 2006; Rhee *et al.*, 2005;

Reed & Lehman, 2005).

What exactly regulates a person's eating behaviour? Little information is available on this issue because defining factors in a person's lifestyle and diet are difficult to pinpoint. According to a study by Yannakoulia (2006) at Harokopio University, Greece, certain behavioral patterns and environmental characteristics influence the eating behaviour of diabetic patients. These patterns and characteristics can include: "Eating history, including food selection, weight control efforts, emotional eating and overeating, levels of nutrition-related knowledge, behavioral responses to diet challenges such as eating favourite foods, weight management, portion control and dinning out.

Mediating variables that impede or facilitate self-dietary care of diabetes may include the level of social support, the degree of self-efficacy and the individual's time management skills (BD, 2005).” However, for management and control to be successful, people must begin to incorporate what they have learnt about nutrition and meal planning into their daily lives. As stated by the American Diabetes Association, “Everyone benefits from healthy eating so the whole family can take part in healthy eating. It takes some planning but you can fit your favourite foods into your meal plan and still manage your blood glucose, blood pressure, and cholesterol” (ADA, 2005).

More people are becoming aware that eating healthy, exercising regularly, and maintaining a healthy lifestyle all contribute to holistic wellness. However, even with this ever-growing health consciousness, there are still 13 million people in United States who suffer from diabetes (Mokdad *et al.*, 2000). Unfortunately, only about 70% of them have been diagnosed while the rest are unaware that they have the disease (NHLBI/NAA, 2006). Although the media have been quite effective in diabetes intervention, the tried and proven method of personally teaching people about the diet/diabetes linkage, and empowering them to improve their health through knowledge of meal planning and preparation as a means of diabetes control, still remains a valuable intervention methodology (Miller *et al.*, 2002; Wilson *et al.*, 2003). This has been the emphasis and vision of the nutrition management education and culinary classes described in this article.

A lack of social support and time constraints are negative factors that can be restraining as well as cause feelings of isolation. Social interruptions such as eating out and other social events also interfere with intake awareness. A person is less likely to remain aware of the nutritional value of his or her food while at a

restaurant or party. The constant strain of micro-managing food consumption can be tasking and stressful. In summary, poor diet awareness combined with an equally poor understanding of the diet/diabetes relationship set the stage for chronic diet-driven diseases (BD, 2005).

METHODS

A group of fifteen graduate-level dietetic interns and eleven undergraduate nutrition students were involved in a teaching exercise as part of their training. Participants to this seminar were gathered through open invitations to churches. One hundred written invitations were sent to different churches, and this was supported by radio announcements from a local radio station. The original response rate to the written invitations was between 50% to 75%. However, the final attendance rate was only 26% (26 participants). The single criterion for attendance at this free seminar was that the participant should have been a confirmed diabetic. Participants were informed at the beginning of the seminar about the nature of the activities and the confidentiality with which the data would be handled. They signified their intention to be involved by moving towards the areas where the interns engaged them in lectures and data collection procedures. These activities were covered under the institution's Institutional Review Board's requirements, because they were carried out as part of normal student training.

This methodology allowed, but was not limited to, one-on-one teaching through hands-on activities. Each of the interns was, therefore, matched up with one or two residents to provide the one-on-one assessment and teaching during these nutrition seminars. They were assisted by the undergraduate students and the Dietetic Internship Program Director in these activities.

In order to reinforce participants' learning and to maximize the effectiveness of this seminar, it was offered twice a year; once at the beginning of the summer semester with a follow up during the fall semester. The seminar was a one-day, four-hour intensive workshop involving hands-on training. The objectives of the seminar were: (a) To help local residents who suffered from diabetes to better manage their condition through diet control, by teaching them how to prepare healthy meals; (b) To train the dietetic interns and students to work individually and also cohesively; (c) To help the dietetic interns and students develop confidence in sharing their nutritional knowledge with the public; (d) To strengthen the dietetic interns' and students' nutritional assessment and counseling skills.

For each seminar the scheduled activities were as follows:

1. Interns and students gathered 24-hour food recall from the participants
2. Interns and students taught the participants in a one-on-one setting, assessing the actual nutrient amounts from the food recall.
3. Participants learned how to make and personalize their meal plans. The basis of the meal plan was an estimation of the needs of each participant for energy, the amounts (in grams) of carbohydrate, protein, and fat, and fluid (in milliliters). They were also taught to use the diabetes exchange list to substitute a specific type of food for another which was similar in carbohydrate, or protein value.
4. A cooking class was offered so that the interns and students could show the participants how to prepare a healthy meal.
5. Interns measured the actual food intake of each participant. This assessment was done at a luncheon given at the end of the cooking class, at which participants were allowed to imple-

- ment their new knowledge by choosing food according to their meal plans.
6. While all participants were given prizes, special incentives were given to participants whose actual food intake was as close as possible to their ideal meal plans.

This study utilizes a type of action research model in implementing one-day nutrition education seminars and evaluating the effectiveness of this intervention. The seminar was aimed at re-educating a group of people about effective means of controlling diabetes through a healthy lifestyle achieved through nutrition management. The seminar can be more specifically described as an awareness programme that assesses, teaches, tests, evaluates, rewards, and promotes nutrition management and the importance of healthy eating in order to teach nutrition management and the importance of healthy eating aimed at preventing complications that may be caused by diabetes. This seminar was not different in content from previous seminars, but was merely a reinforcement of what had been taught previously by the other health care professionals.

We classify this research as a quasi-experimental before and after model. The nutrition-related data gathered consisted of measurements of the nutrient values of: (a) a dietary recall, (b) an ideal meal plan for each participant, (c) a personal meal plan constructed by each participant with the help of the interns, and (d) foods chosen by each participant at the end of the seminar. We perceive the dietary recall as the pre-test, and the chosen diet as the post-test of the before and after components. The ideal plan is the standard against which we measure the consumption of the participants, and their personal meal plan is seen as their consumption preference as it relates to the instruction given at the seminar. To satisfy this research component, careful measure-

ments of other variables were taken which included: demographic variables, anthropometric measurements such as height and weight (for the computation of body mass indices), body fat percentages, and blood pressure. Calculations were made of participants' intake of fat, calories, and protein, for dietary recall, ideal meal plans, personal meal plans constructed by participants, and food chosen at the end of the seminar.

The objective of the research component was to investigate the effectiveness of the combined seminar, one-on-one, repeat instruction method, in changing the eating habits of a group of middle age diabetic individuals.

SUBJECTS

Participants of this seminar (N=26) included both male and female middle-aged to elderly diabetic adults from the neighborhoods in the immediate vicinity of the college. Data collected from each participant included age, height, and weight, body fat percentage and blood pressure measurements. However, measures of fasting blood sugar or HbA1c were not taken because our facilities and study protocols were not set up for such invasive types of data collection. This group had a mean age of 50.9 years. Because this seminar had been given by previous classes the list of invitees (participants) included some people who had attended the seminar before, some as many as six times. The mean attendance at a nutrition seminar was 3.0 times. The mean Body Mass Index (BMI) of the group was 31.33, which is considered between overweight and grade II obesity (Centers for Disease Control and Prevention, 2002)

RESULTS

We carried out a number of means comparisons (paired and independent samples

t tests) in order to assess the effectiveness of the overall programme. Firstly, we compared the dietary recall with the content of the ideal meal plans. Thus we tried to determine the gaps between what participants actually ate and what they should have been eating. Secondly, we compared the ideal meal plan with the meal plan made by the participants. The objective here was to assess whether participants were able to translate the theoretical ideal of food nutrients to actual food.

The secondary objective of this comparison was to find out if there were personal preferences that served to override intellectual food choices. Thirdly, we compared the foods chosen by participants with the ideal meal plan, their own individual plans, and with the dietary recall taken at the beginning of the seminar. These comparisons would likely indicate both the effectiveness of the seminar and the strength of ingrained dietary practices.

Table 1 shows the comparison of the dietary recall with the meal plans. The participants consumed a significantly greater amount of calories, proteins, and fats than they needed. For these three nutrients, dietary recall was significantly greater than the ideal needs ($p < 0.001$).

We subsequently proceeded to compare the content of the participants' personal meal plan with their ideal meal plans. As shown in Table 2, the ideal meal plans contained significantly less total amounts of the nutrients than were evident in the personal meal plans made by participants. Participants actually preferred an average of 113 more kcal of calories ($p < 0.05$) and 13 more grams of fat ($p < 0.01$) than was recommended for their consumption, even after a session of education about nutrient values in food. The mean difference in protein was not significant.

Our third analysis compared the foods chosen by the participants (our

posttest measure), to (a) the ideal meal plan, (b) their personal meal plan, and (c) the dietary recall (our pretest measure). These comparisons are combined in Table 3.

Table 1. Paired samples t test comparison of dietary recall with meal plan/ideal diet (N = 26)

Nutrients	Paired Differences			
	Mean	Std Dev	T	Sig
Calories (kcal)	1404.3	1210.2	5.917	0.000
Protein (g)	66.4	66.3	5.106	0.000
Fats (g)	43.4	65.4	3.385	0.002

Table 2. Paired samples t test comparison of ideal meal plans with participants' meal plans/participants' preference (N = 26)

Nutrients	Paired Differences			
	Mean	Std Dev	T	Sig
Calories (kcal)	-113.1	221.2	-2.607	0.015
Protein (g)	-5.7	17.4	-1.687	0.104
Fats (g)	-13.0	18.4	-3.612	0.001

The comparisons in Table 3 show firstly that the foods chosen by participants contained significantly greater amounts of energy and the two nutrients

than the ideal food plans advocated by the dietetic interns. The second result of this comparison showed that the energy and nutrients contained in the foods chosen by the participants were very close to their own meal plans (there were no significant differences with any of the three nutrients). Actually, this result indicated a rejection of the ideal meal plan proposed by the interns, in favor of the participants' own meal plan. The third comparison showed that participants chose to consume significantly less of the three nutrients after their exposure to the seminar ($p < 0.001$ for all three nutrients).

DISCUSSION

Old habits are difficult to break, and by conducting the seminars with middle age to elderly participants, we faced the challenge of re-educating and influencing an age group with very entrenched habits, and trying to encourage them to completely alter their life-long habits to new ones that demand a great deal of motivation. It is also noteworthy that this group could be classified as between overweight and grade II obesity.

Some participants had previously attended this nutrition seminar. With a mean of 3.0 times for participants who has previously attended it was conceivable that dietary changes could be made.

Table 3. Paired t test comparisons of nutrients in chosen food with: (a) ideal meal plan, (b) participants' personal meal plan, and (c) dietary recall (N = 26)

Nutrients	Mean differences		
	Chosen food with Ideal plan	Chosen food with Personal plan	Chosen food with Dietary recall
Calories (kcal)	111.0*	-2.0	-1293.3***
Protein (g)	7.0*	1.2	-59.4***
Fats (g)	9.1*	-3.9	-34.3**

Note: Significance levels * < 0.05 , ** < 0.01 , *** < 0.001

Previous research shows that reinforcement of nutrition education is key to motivating people to making dietary changes (Hornik, 2006). Repeat attendance may indeed have helped to reinforce the nutrition principles taught, and enabled participants to display the positive steps revealed by this study.

Comparison of the 24-hour dietary recall with the ideal meal plans recommended to the participants (Table 1) shows a consumption pattern of over-nutrition. It can safely be concluded that this dietary pattern had contributed to the mean BMI of 31.33 seen in this group. Given the age of this group (50.9 years), one may also conclude that this nutritional pattern was well entrenched. Also to be noted is the fact that despite their previous contact with nutrition knowledge and guidance, and despite the fact that they were confirmed diabetics, these persons still needed the further reinforcement of the nutrition seminar before satisfactory results were visible. Follow-up groups, as stated in the literature review, are essential in enabling people to make dietary changes (BD, 2005).

The construction of personal meal plans by the participants was done with refreshed nutrition knowledge and the guidance of the interns. Despite this guidance, the participants' constructed plans were significantly higher in both calories and fats than the ideal levels of these nutrients (Table 2). This may be the result of personal preferences dominating scientific knowledge. Despite the statistically significant difference of these meal plans in these two areas however, the differences were not very large. It is a matter of conjecture if these differences could, over time, account for overweight to the level seen in this group.

The comparison of the chosen meal with the ideal plan (Table 3) shows that study participants did not comply with the ideal plans constructed for them. This may be the result of weak identification with

these ideal plans. Put differently, participants may have felt that they did not "own" the decisions involved in the construction of the ideal plans. We argue that people need to strongly identify with and own the decisions they make if they would co-operate with these decisions and live comfortably with them. An observation of the comparison of the chosen meals with the participants' personal plans shows that participants followed the plans they made very carefully. There was no difference between the nutrient values of the plans they made for themselves and the nutrient values of the food which they chose from among the prepared food items.

The short-term success of this seminar is however evidenced by the large differences between the dietary recall (pre-test measurements) and the chosen meals (post-test measurements). In the case of all three nutrients there were very significant reductions in the nutrient amounts which participants chose to consume by the end of the seminar. It is indeed a positive sign that a slightly overweight group has chosen to reduce their food intake after a seminar of this nature.

These apparent victories however should still be placed within the context of this group's dietary recall at the beginning of the seminar, and their average age. This is the fourth seminar for many in this group, yet the gap between their actual consumption and their dietary need was so large. There are indeed no quick fixes when changing the dietary habits of those most vulnerable to diabetes. Old habits indeed die hard. It is inconceivable that participants will learn all that is necessary in only one session. It is important therefore for reinforcement through group classes or one-on-one counseling to become a prominent feature of the control of diabetes through diet intervention. As nutrition education is reinforced people will learn and remember more, and be able to put what was taught into practice (Hornick, 2006).

Although we see this study as a positive step towards understanding the actions of people in their challenge to control diet in the pursuit of reducing diabetes, this study is not without its limitations. We recognise that this research has utilized a small sample which was self-selected because of the recruitment of participants. This is a limitation that cannot be overlooked in an attempt to apply the findings of this research to wider populations. We feel also that a longitudinal approach would provide a much greater opportunity to observe whether the short-term changes in diet pattern which we observed would hold for the long term. Finally, we feel that replications are needed to try to eliminate the bias which may have been introduced into this study by the different skill levels of interns as they interacted with the participants on a one-on-one basis. Nevertheless, we feel that the main lesson learnt by this exercise, that there are no quick fixes to changing diet patterns, is a valuable one for change agents in the arena of diet and diet intervention.

CONCLUSION

People must be thoroughly informed so that they may make wise nutritional decisions such as being consistent with an appropriate diet. Aside from being completely informed, counseling should be "matched to the person's level of motivation and readiness for change, encouraging the use of goal setting, identification of barriers, problem solving, self-monitoring, self-reinforcement, and stimulus control" (Wangberg, Arsand & Anderson, 2006).

The ideal objective of 24-hour seminars is for the participants to leave with a strong sense of commitment to diet and exercise through an internalization of the information they receive. They must also understand the necessity of self-motivation as they work towards the goal of a healthier future. Indeed, among the most

important keys to motivating people towards being more health conscious are reinforcement, and a sound support structure of family, friends, and even co-workers. Nutritional education is vital to a change in dietary habits, therefore it is important to constantly reinforce this knowledge with information which is non-conflicting and flexible enough to accommodate participants' choices (Hornik, 2006). People who receive continual reinforcement make the necessary dietary changes to improve their health (Rhee *et al.*, 2005). Continual reinforcement through one-on-one follow-up appointments or group classes allows participants to feel confident in changing dietary habits.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the following: Trisha Alderson, Vanessa Bradley; Sandra Escobedo; Roshanda Gaddis; Kendra Hampton; Christina Liew; Beverly Renae Miller; Marisela Montoya; Suzanne Perez; Elisa Rodriguez; Morgan Rouleau; India Sachitano; Wendy Schenk; Stephanie Shannon; Kyrrah Webb; and Carmalita Green.

REFERENCES

- ADA (2005). What is a Healthy Diet? American Diabetes Association. 30 Jun. 2005.
<<http://www.diabetes.org/nutrition-and-recipes/nutrition/healthy-diet.jsp>>
- Hornik RC (2006). Nutrition Education: A State-of-the-Art Review. 10 Oct 2006.
<<http://www.unsystem.org/scn/archives/npp01/ch3.htm#b16Reinforcement%20of%20Messages>>
- Kurtzweil P (1994). The new food label: making it easier to shed pounds - includes related information - Part

- One. FDA Consumer. July-August 1994. pg 1.
http://findarticles.com/p/articles/mi_m1370/is_n6_v28/ai_15546888
- Mac WJ, Phillips P & Stanek J (2006). Empowering patients with essential information and communication support in the context of diabetes. *Int. J Med Inform* 75 (8): 577-96.
- Miller CK, Edwards L, Kissling G & Sanville L (2002). Evaluation of a theory-based nutrition intervention for older adults with diabetes mellitus. *J Am Diet Assoc* 102: 1069 - 1081
- Mokdad AH, Ford ES, Bowman BA, Nelson DE, Engelgau MM, Vinicor F & Marks JS (2000). Diabetes trends in the US: 1990 - 1998. *Diabetes Care* 23: 1278 - 83.
- NHLBI/NAA (2006). Nutrition Academic Award Program: Advancing Nutrition, Medical Education, and Clinical Practice, National Heart, Lung and Blood Institute. "Metabolic/Endocrine Systems". 6 July 2006.
http://www.nhlbi.nih.gov/funding/training/naa/curr_gde/e1_obesity.htm
- Rhee MK, Slocum W, Ziemer DC, Culler SD, Cook CB, El-Kebbi IM, Gallina DL, Barnes C & Phillips LS (2005). Patient adherence improves glyce-mic control. *The Diabetes Educator* 31 (2): 240-250.
- Reed K & Lehman ED (2005) Diabetes website review: 2aida.org. *Diabetes Technology and Therapeutics* 7 (5): 741-54.
- BD Diabetes (2005). Diabetes education. <<http://www.bddiabetes.com/us>>
- Wangberg SC, Arsand E & Anderson N (2006) Diabetes education via mobile text messaging. *J Telemed Telecare* 12 Suppl: 55-6
- Wilson C, Brown T, Acton K & Gilliland S (2003). Effects of clinical nutrition education and education discipline on glycemic control outcomes in the Indian health service. *Diabetes Care* 26: 2500 - 2504.
- Yannakoulia M (2006). Eating behavior among Type 2 diabetic patients: A poorly recognized aspect in a poorly controlled disease. *The Review of Diabetic Studies* 3 (1): 11 - 16.