

# Diet Therapy of Diabetes

## Description of a Successful Methodologic Approach to Gaining Diet Adherence

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### SUMMARY

A multifaceted educational program was designed to maximize dietary adherence of twenty-three diabetic subjects in order to study two experimental diets for forty weeks. The results of the program showed that a high level of diet adherence was achieved in spite of the strict dietary guidelines. The success of the educational approach was also reflected in the high attendance rate (99 per cent of 270 subject visits) and the low voluntary attrition rate (4 per cent).

Five aspects of the over-all design were felt to have been of major importance in gaining subject cooperation: (1) the small, group-oriented learning process; (2) frequent intervals of follow-up; (3) feedback on laboratory data; (4) individualization of diet prescriptions; and (5) family involvement.

Since the majority of diabetics seen in medical clinics fail to follow their prescribed diets, the concepts and approach applied to this study may be applicable to the dietary management of diabetic patients. Such implications and specific recommendations are presented in this report. *DIABETES* 23:669-73, August, 1974.

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Dietary management has been shown to be of major importance in the control of diabetes.<sup>1,2</sup> A renewed awareness of this fundamental role of diet therapy has come in the wake of the University Group Diabetes Program which questioned the safety of the oral

hypoglycemic agents.<sup>3</sup> However, there is little advantage to this awareness until more is known about (1) the optimum diet for diabetics, particularly with regard to the proportions of carbohydrate and fat, and (2) why most diet prescriptions are doomed to failure for lack of patient adherence.

In a recently reported investigation<sup>4</sup> an attempt was made to resolve the effects of diets differing in carbohydrate and fat content on glucose control and lipid levels in an outpatient diabetic population. Since the outcome of that study was wholly dependent on dietary adherence and the evaluation thereof, major emphasis was placed on gaining the subjects' full cooperation. The systematic educational approach utilized was successful in motivating the study subjects to achieve a high level of adherence. In contrast, previous studies have shown that a large percentage (53 to 88 per cent) of diabetic patients fail to follow their prescribed diets.<sup>1,2,5-7</sup> West<sup>8</sup> emphasized in practical terms the fact that this represents an ineffective and wasteful effort in diet counseling. In light of this, a description of the methodologic approach used in the above investigation<sup>4</sup> and its implication for the successful dietary management of diabetic outpatients are presented in this report.

### METHODS

#### *Subjects*

Twenty-three adult diabetic subjects treated with diet and, in some cases, supplementary oral hypoglycemic agents were studied. Four subjects were subsequently asked to discontinue the study because of significant emotional problems or family discordance

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precluding total cooperation, and one dropped out for unclear reasons. The educational and socioeconomic levels ranged from elementary school to college and low income to upper middle income levels, respectively. The majority were blue collar workers. Subjects were male and female with a mean age of sixty years. Mean body weight, as per cent of ideal,\* was  $109 \pm 12$  S.D.; no one was considered obese.

#### *Diet Prescription and Evaluation*

The composition of the experimental diets is presented in table 1. The method of dietary instruction followed the guidelines published in "Meal Planning with Exchange Lists."<sup>9</sup> The actual prescriptions, however, were based on an initial evaluation of each individual's customary eating habits by use of a three-day recorded intake, a written diet history and a personal interview.

Carbohydrates were distributed throughout the day and emphasis was placed on day-to-day consistency. No refined sugars were permitted beyond one-half cup of plain ice cream per week and selected low-sugar cookies. Since the primary intent of the investigation was to evaluate the effect of the experimental diets on diabetic control and blood lipids,<sup>4</sup> caloric levels were designed to maintain a constant body weight throughout the study. Fats were prescribed and evaluated according to their vegetable or animal

origin, and both animal fat and cholesterol were restricted.

Dietary intakes were evaluated at four-week intervals for forty weeks. Calculations were based primarily on recorded three-day intakes with representative samples of weekends and holidays. These data were complemented and verified by detailed frequency food intakes (frequency of use of specified food items) completed in interview with the research nutritionist at each four-week visit. The same nutritionist was responsible for all subject contact, encompassing instruction and evaluation.

#### *Study Design*

Subjects were seen initially and then on weeks 2, 4, 6, 8, 12, 16 and 20 while on each experimental diet, for a total of fifteen visits in the course of forty weeks. Except for three to six days of inpatient testing on week 20 of each diet period, all were outpatient visits in which the subjects were seen in small groups of three or four members each. Group sessions were conducted as follows:

1. Each session was led by the research physician and nutritionist. Spouses were welcomed. Meetings were held in a comfortable setting in the Hospital Clinical Center beginning at 8:30 a.m.
2. A program of instruction and group discussion covering diet and diabetes took place over breakfast and usually lasted until 10 a.m. (Breakfast was prepared by the research kitchen and used as a teaching aid.) Special teaching materials were prepared and distributed to correlate with the topics of discussion.
3. Each subject was then seen individually, both by the physician and by the nutritionist. At that time pertinent laboratory data were discussed and charted in the subject's personalized record folder and a dietary interview was carried out. Sessions generally ended by noon.

Monetary compensation was five dollars per visit to cover transportation.

## RESULTS

#### *Dietary Intakes*

On the 40 and 60 per cent carbohydrate diets, the calculated intakes revealed that mean levels of 42 and 56 per cent, respectively, were achieved for the five-month periods. These values were attained with the use of unrefined carbohydrates as starch, fruit and milk. Beyond the small amounts permitted, the use of refined sugar was negligible. Restriction of dietary cholesterol and animal fat was practiced as prescribed.

\*According to "Build and Blood Pressure Study," 1959, Society of Actuaries (Chicago).

TABLE 1  
Composition of prescribed and calculated dietary intakes

	Prescribed intake	Calculated Intake*	
		Mean	S.D.
<i>Low carbohydrate diet</i>			
Calories/Day	To Maintain Weight	1856	$\pm 298$
Carbohydrate (%†)	40	42	$\pm 3$
Fat (%)	45	43	$\pm 3$
Protein (%)	15	15	$\pm 1$
Cholesterol (mg./day)	300-400	301	$\pm 61$
Veg./Animal fat ratio	0.5-1.0	0.7	$\pm 0.2$
<i>High carbohydrate diet</i>			
Calories/Day	To Maintain Weight	1816	$\pm 304$
Carbohydrate (%)	60	56	$\pm 3$
Fat (%)	25	28	$\pm 2$
Protein (%)	15	16	$\pm 1$
Cholesterol (mg./day)	300-400	242	$\pm 56$
Veg./Animal fat ratio	0.5-1.0	0.6	$\pm 0.2$

\*Values represent means for each five-month diet period based on monthly three-day recorded intakes and frequency of food item use evaluations.

†Per cent of calories.

Calculated intakes are presented in table 1.

#### *Weight Control*

Body weight change between diet periods was negligible: 0.0 kg.  $\pm$  1.1 S.D.

#### *Attendance and Attrition Rates*

Of the 270 potential visits there were three absentees in the course of forty weeks—an attendance rate of 99 per cent. The voluntary dropout rate was one out of twenty-three subjects, or 4 per cent.

### DISCUSSION

The high degree of dietary adherence of this diabetic population exceeded initial expectations. Although the subjects were known diabetics and had been followed in a nutrition clinic, their dietary patterns upon entering the study revealed that none had had a satisfactory working knowledge of the Exchange System,<sup>9</sup> and only one-third had been restricting their use of refined sugar on a routine basis. Nor had they been accustomed to incorporating fruit into their daily diet, which has been reported to be a frequent source of poor dietary adherence among diabetics.<sup>7</sup> The prescribed restriction on concentrated sweets added significantly to the difficulties of achieving a high carbohydrate intake. In fact, in order to attain 60 per cent of calories as carbohydrate, some subjects were eating as many as twelve fruit and fourteen starch exchanges (servings) per day. However, adherence to modifications in the types of carbohydrates and fats (simple, complex; saturated, unsaturated) was far less difficult than adherence to their proportions, which now involved an understanding of the food exchanges in order to plan and account for each day's intake.

Whereas dietary intakes were measured by three-day records and frequency of food item use evaluations, these were not the sole guides for recognizing diet adherence. Since the diet prescriptions were calculated to maintain initial body weight, changes in weight appeared to be a sensitive, though nonspecific, index to dietary inaccuracies. (The general level of activity seemed to vary little.) The degree of weight stability between diets lent support to the high level of adherence the subjects achieved. Other indices of subject cooperation were the attendance rate of 99 per cent and voluntary dropout rate of 4 per cent. These rates were particularly notable recognizing that the time commitment of each subject (many of whom were working), devoted to the group sessions alone, was over forty-five hours.

The extent to which any patient can be expected to alter his usual diet behavior is probably directly re-

lated to his level of motivation, as suggested by Ohlson.<sup>10</sup> In turn, the level of motivation can be greatly influenced by the educational process.<sup>11,12</sup> In this study five facets of the over-all approach were felt to have been of major importance in eliciting diet adherence and subject cooperation.

1. The *group-oriented learning process* has previously been found to be successful in altering the eating behavior of both diabetic and nondiabetic patients.<sup>13-15</sup> The small group process appeared to have many advantages for this study as well, among them the following:

- a. It aroused less anxiety than a one-to-one professional-patient relationship.
- b. It allowed interchange on a peer level, removing the uniqueness of problems which may prevent the individual from openly dealing with dietary frustrations.
- c. It instilled a sense of competition to achieve.
- d. It involved group decision in the educational process,<sup>15</sup> which was directed at helping each subject recognize the rationale for his therapy and thus to elicit his own management efforts.

The level and direction of group interaction changed with time. Since interchange among subjects progressed slowly, the first three or four sessions were conducted as programmed instruction led by the physician or nutritionist, thus allowing time for interpersonal relations to develop. Subsequently, the sessions became more spontaneous with open discussions arising from a key comment or question. In time, peer interchange took place outside of the group sessions for social reasons and for discussion of problems related to the diets. At the end of the forty weeks many of the subjects worked cohesively to become the charter members of the present Boston Area Diabetes Club.

Ninety-two per cent of the subjects responding to a questionnaire felt, in retrospect, that the small group sessions were more effective and preferable to their previous experience with individualized dietary follow-up. Further, it was our belief that familiarity with the same dietitian throughout the follow-up period served to greatly enhance personal interaction and learning, and to facilitate the evaluation of patients' dietary adherence.

2. *Frequent follow-up* at two- and four-week intervals seemed crucial to sustaining individual dietary effort. The need for repeated contacts over considerable periods of time for reinforcement and encouragement is well recognized.<sup>10,16</sup>

3. *Feedback* on all pertinent laboratory and physical

findings to each subject was routine and expected, and seemed to heighten individual interest and involvement in his dietary management.

4. Recognizing that the diet prescription cannot be effective out of the context of the patient's customary eating behavior,<sup>17-19</sup> emphasis was placed on incorporating each subject's *usual dietary habits*. For example, ethnic dishes, familiar meal patterns, personal tastes, and food costs were all accommodated within the constraints of the study guidelines.

5. As stressed by Ohlson,<sup>10</sup> there must be *family involvement* in learning and accepting the diet in order for the patient to be so motivated. Such involvement was felt to be essential for diet adherence and was sought in several ways. Spouses were welcomed to all group sessions and were asked to join in dietary interviews. All spouses were contacted at some time in the course of the study, and two wives regularly attended the group sessions. Key family members were expected to assist in the selection and preparation of meals and to help complete the three-day intake forms. Interaction among study members, family and the investigating team was heightened by two social occasions in the course of follow-up. Each occasion centered about teaching games and a large "diabetic" buffet prepared entirely by the subjects and their families.

The intent of this investigation, as previously reported,<sup>4</sup> was to evaluate the two prescribed diets in a diabetic population. The study was not designed to separate all the variables which could have influenced patient cooperation, and, thus, it is recognized that the commitment and enthusiasm of the researchers for the study may have affected the participants' response. Nevertheless, the systematic educational approach used was undoubtedly the framework within which the objectives were achieved.

#### IMPLICATIONS

The ancillary findings of this study indicate that a high degree of dietary adherence and patient cooperation can be accomplished in an outpatient diabetic population by way of a multifaceted educational program. Although the circumstances under which the study was conducted were unique, with some modifications the concepts and approach used might be applicable to the dietary management of diabetics, conceptualized below.

Initially, each patient would have a dietary evaluation and an individualized diet prescription. At that time one would attempt to determine if the patient

would benefit more from a group setting or need the one-to-one approach. Each group would consist of approximately six to eight patients and those spouses wishing to attend and would be led consistently by the same nutritionist. Sessions could be expected to last one hour. It is important that the group leaders have some preparation in the use of the small group process.

The initial four or five sessions should meet at about two-week intervals and include a formalized program of instruction by the nutritionist, covering the dietary aspects of diabetes. This relatively intensive period of learning allows patients to more rapidly reach a level of interchange and an appreciation of the importance of the dietary program. During this period of time, patient participation should be encouraged and an atmosphere of informality created. As group familiarity progresses, sessions should become more spontaneous and informal, and follow-up would expand to approximately two-month intervals. Those aspects of diabetes requiring specialized instruction (e.g. by physicians, podiatrists, nurses) could be handled separately as a rotating series of lectures open to all diabetics, with questions and comments being brought back to the small group for discussion.

Since education and support are continuing needs, it might be possible to join the more advanced groups into larger self-help units, similar in operation to Weight Watchers or Alcoholics Anonymous. This would decrease the active role of the professional to an advisory capacity. A future study might be designed to consider the cost-effectiveness of this educational approach through a comparison of the rate of hospitalization and use of medical facilities between experimental and control groups.

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