

Characteristics that enhance adherence to high-carbohydrate/high-fiber diets by persons with diabetes¹

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Abstract This study sought to characterize 40 clients with diabetes, 19 of whom adhered to a high-carbohydrate/fiber diet and 21 of whom did not, in accordance with the adherence pattern. There would seem to be distinct differences in the characteristics of adherers and non-adherers. Dietary adherence was found to be independent for sex, age, occupation, marital status, ethnicity, and education. However, comparison of the groups' health and dietary perceptions showed that non-adherers, as opposed to adherers, were not concerned about reaching their ideal body weight; needed to be motivated to exercise by family or friends; did not perceive diabetes as a threat to their health; were not satisfied with their knowledge about diabetes; were not content with their nutrient status but believed they were consuming adequate amounts of carbohydrate; and believed that they did not need to change their intake of fruit, vegetables, and bread—liking/disliking of these foods being the most important barrier to dietary change. Such patients, identified in screening for potential dietary non-adherence, may benefit from the use of educational strategies different from those used with patients who are more oriented toward health. *J Am Diet Assoc* 88:1422, 1988.

Despite the promotion of the high carbohydrate-fiber (HCF) diet in recent years, reports suggest that persons with diabetes are still consuming excessive amounts of fat and insufficient amounts of carbohydrate (1-5). Adherence³ to dietary regimens by individuals with diabetes has long been documented as poor (6-8). There has been a great deal of speculation about the reasons for the poor adherence. However, systematic research in the area is only just beginning.

In general, studies have shown that dietary adherence is not consistently related to the patient's age, sex, occupation, intelligence, education, or marital status (3, 9-11). Even knowledge about diabetes and its treatment has not been found to be a constant predictor of dietary adherence (3,8,12,13). Current research suggests that patients' beliefs and attitudes about diabetes and their health are major factors in their cooperation with treatment plans (14). Perceived vulnerability to illness and perceived severity of the disorder have been shown to be associated with dietary adherence (10,15,16). Webb and associates (15) have also reported that persons with diabetes who perceive dietary treatment as effective and who find few barriers to the treatment adhere more readily to dietary recommendations.

More investigation is required to find social-psychological variables that are reliable predictors of adherence. Such information would be invaluable to the health care professional. If adherence predictor information could be collected during the initial interview, then decisions could be made regarding the method, time, and approach needed to achieve the desired dietary change. The purpose of the present investigation was to consider differences (particularly in beliefs, attitudes, and motivational states) between individuals who adhered to the dietary recommendations and those who did not, in an effort to identify determinants of dietary adherence.

Method and procedures

Subjects

The study was conducted during June and July 1985. A sample of 40 subjects attending a diabetes outpatients' clinic at Prince Henry's Hospital, Melbourne, Australia, was studied. Subjects were selected consecutively. The sample comprised 12 clients with insulin-dependent diabetes and 28 clients with noninsulin-dependent diabetes.

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³We prefer not to use the term "compliance" because it implies, more than "adherence," that patients are required to do what the health professional instructs, rather than what the patients contract.

Of the 28, 14 required insulin, 10 were on oral hypoglycemic agents, and 4 were treated with diet alone. The subjects averaged 50 years of age (ranging from 20 to 90 years), and there were equal numbers of men and women; 50% of the subjects had retired. The mean duration of diabetes was 5 years (ranging from 0 to 15 years), and half of the subjects had visual impairment. The subjects were Caucasians, except for two of Asian origin. Half of the subjects did not have spouses, and one-third were living alone. Thirty-three of the 40 patients could speak and read English well; 24 had been born in Australia. Most of the non-Australian born were of Italian, Greek, German, or Polish origin.

Survey instrument

A questionnaire was used to investigate characteristics that might facilitate or inhibit adherence to the HCF diet.

Existing literature on determinants of dietary adherence was utilized in the design of some of the questions (e.g., the Health Belief Model [14]). Worsley's (17) recommendations concerning the design of questionnaires were followed throughout the development of the survey instrument. The questionnaire was designed to be self-administered.

To assess understanding and acceptance of the questionnaire, draft versions were pretested on a number of small groups of persons (both Australian and non-Australian born) attending a diabetes outpatient clinic at Prince Henry's Hospital. Revision of the instrument was made on the basis of comments received during the pretesting phase. The final version of the questionnaire consisted of 54 questions arranged in five major sections. The first two sections were based on Worsley and Crawford's study (18) of the Melbourne population, with modifications to make the questionnaire more applicable to diabetes.

The five sections are:

1. *Your health and health habits*
 - perceived threats to health
 - perception of health relative to other priorities
 - changes one would most like to make
 - exercise, stress, weight, alcohol, smoking
2. *Your diet*
 - estimation of usual daily intake of fruit, vegetables, bread, meat, dairy products, fat, sugar and sweeteners
 - perceived barriers to dietary change of above mentioned foods
 - perceived directions for dietary change of nine groups of foods
 - perceived nutritional status regarding content of nine nutrients in the diet
3. *How you feel about your diet*
 - attitudes towards his/her diet, e.g., restrictive, different, unhealthy, barrier to social life
4. *How you feel about diabetes*
 - attitudes towards diabetes, e.g., serious disorder, susceptibility to health problems, efficacy of treatment, involves sacrifice and inconvenience
5. *Background*
 - age, sex, occupation, education, country of birth, duration of diabetes, type of treatment, and any handicaps

Analysis

The aim of the analysis was to investigate the relationship between subject characteristics and dietary adherence.

Non-parametric statistical methods (chi-square contingency table analysis) were used for that purpose because of the qualitative nature of the study. Respondents were categorized into two groups according to their adherence to the HCF diet. These were adherers (HCF group, no. = 19) and non-adherers (LCF group, no. = 21).

Dietary information elicited from the questionnaire was not intended to permit determination of daily macronutrient intake, as that would have made the questionnaire too long. Detailed food intake was not available for all subjects from clinic charts. Diets of known macronutrient content used by those with diabetes were utilized to describe a HCF diet (>50% energy intake from carbohydrate and <30% from fat) and a LCF diet (<50% energy intake from carbohydrate and >30% from fat) in food terms. Serving sizes recommended for individuals with diabetes by Taft and Wahlqvist (19) were also used. Patients found to be consuming <3 pieces of fruit per day, <3 servings of starchy vegetables per day, and <3 slices of bread per day and who used high-fat cooking methods were categorized as being in the LCF group. Patients who consumed more than those amounts and who used low-fat cooking methods were defined as being in the HCF group. Adherence was cross-checked with diet reports in medical histories. Food intake data have not been linked to biochemical indexes of metabolic control in this study, as that was not its purpose.

Results and discussion

All subjects were asked to answer the questionnaire. Of the 40 patients, 26 managed to complete the questionnaire without assistance. The remainder had the questionnaire presented orally, either because of language difficulties (7 patients) or because of visual impairment (6 patients). For the 7 patients who could not read English well, the questionnaire was presented orally in English or (for 2 patients) in their own language by an interpreter. The sex distribution of the sample (no. = 40) and of the total diabetic outpatient population (no. = 1,000) was similar: 50% men and 50% women and 55% men and 45% women, respectively. The age distributions of the sample and of the total population were, respectively, 10 to 30 years, 15% and 15%; 31 to 50 years, 12.5% and 15%; 51 to 70 years, 57.5% and 50%; 71 to 100 years, 15% and 20%. This suggests that the sample was representative of the outpatients with diabetes attending Prince Henry's Hospital.

Only 19 patients adhered to a HCF diet; 21 patients consumed an LCF diet. These findings are consistent with other reports (1-5). Unfortunately, information was not available in all cases regarding original diet instruction; however, a HCF diet has been recommended to patients with diabetes at this hospital since at least 1979.

Characteristics of adherers and non-adherers

Statistically significant group differences are summarized in Table 1. Dietary adherence was not dependent on age, occupation, marital status, ethnic group, or education. This finding is consistent with the findings of other studies (3,9-11). However, more women (12 out of 20) than men

Table 1. Dependence of diet adherence on subject characteristics*

question	response	HCF group (no. = 19)		LCF group (no. = 21)	
		no.	%	no.	%
Right now, is diabetes a threat to your health?	yes	9	47	4	19
Would you like to know more about what diabetes is?	yes	2	10	9	43
Would you like to know if diabetes is curable?	yes	1	5	9	43
Is reaching your ideal weight the most important change you would like to make?	yes	5	26	1	5
Do your friends or family motivate you to exercise?	yes	4	21	16	76
Do you have problems walking without assistance?	yes	3	16	8	38
What stops you from eating more fruit?	no need	10	53	5	24
	not like	1	5	7	33
What stops you from eating more vegetables?	not like	1	5	6	29
What stops you from eating more wholemeal bread?	not like	0	0	4	19
To improve the control of your diabetes, should you eat more wholemeal bread?	yes	2	10	9	43
Does your usual diet contain too much sugar?	yes	0	0	5	26

*All the above group differences have a p value of $<.05$ associated with chi-squared tests of dependence of diet adherence on subject characteristics.

(7 out of 20) appeared to follow dietary recommendations ($p < .1$). Worsley and Crawford (18,20) have reported a similar finding. Patients who had problems walking without assistance (11 out of 40) were also found to be non-adherers (8 out of 11) ($p < .05$). Those who had difficulty walking may be those with physical handicaps that could influence food acquisition and preparation. Visual impairment did not appear to affect adherence to the HCF diet.

Some studies have reported that dietary adherence decreases with increasing duration of diabetes (7-9,21). Such a trend was also seen in this study ($p < .1$). There were no statistically significant differences found between the type of diabetes or treatment and dietary adherence. Webb and associates (3) have reported a similar finding.

Adherers believed that diabetes was a threat to their health ($p < .05$). This finding is consistent with the findings in other studies (15). Health was valued highly in both diet groups. However, several trends suggest that adherers were more health oriented. For example, they tended to exercise regularly (16 adherers, 11 non-adherers) ($p < .1$), to avoid smoking (15 adherers, 10 non-adherers) ($p < .1$), and to want to reach their ideal body weight (5 adherers, 1 non-adherer) ($p < .05$). They also appeared to be more determined and motivated individuals, since they claimed not to require encouragement from others to exercise (16 adherers, 4 non-adherers) ($p < .05$).

Non-adherers appeared to believe that they were consuming too much fat (7 non-adherers, 1 adherer) ($p < .1$) and sugar (5 non-adherers, 0 adherers) ($p < .05$) and too little fiber (7 non-adherers, 1 adherer) ($p < .1$) in their diets. Sixteen of 21 non-adherers believed that their diets contained the right amount of starch. Adherers were inclined to report that they were consuming the "right amount" of all the nutrients.

The belief that there is no need to change the intake of the target foods (fruit, vegetables, bread, meat) was expressed more by adherers, especially in regards to fruit (5 adherers, 12 non-adherers) ($p < .05$). The barriers associated with liking/disliking appeared to be the least important for adherers (1 out of 19) ($p < .05$), in contrast to the non-adherers (7 of 21). A similar finding was

reported by Worsley and Crawford (20). It may be that adherers are more determined persons, who regard such barriers as relatively minor obstacles to desirable dietary goals. Fourteen non-adherers believed that there was no need to change their intakes of vegetables, fruit, and fatty foods. However, 9 non-adherers and 2 adherers ($p < .05$) felt the need to eat more bread in order to control their diabetes. The conservative "no change" position of the adherers was presumably owing to the belief that they had already altered their diets and further change was unnecessary.

In contrast to the non-adherers, adherers tended to believe that most individuals would be a lot healthier if they followed a diabetic diet ($p < .1$), that the proper control of their diabetes did not involve sacrifice and inconvenience, and that maintenance of blood sugar within normal range would prevent complications. Further investigation is required to confirm those trends, because a number of authors (9,15,21) have reported that persons with diabetes who believe that dietary treatment can be effective and not difficult are more likely to follow dietary recommendations.

Because of constraints on the length of the questionnaire, assessment of knowledge was limited. Half of the non-adherers believed that the foods a person with diabetes should eat most are those that have a lot of carbohydrate. They also expressed the need to learn more about diabetes and whether it was curable (9 non-adherers, 1 adherer) ($p < .05$). More knowledge, however, may not facilitate desirable dietary change if there have not been parallel changes in attitudes and beliefs (3,8,12,13). Moreover, only half of the adherers indicated that it is important for persons with diabetes to eat unrefined carbohydrate foods.

Patients living alone were more inclined to adhere to dietary recommendations. A similar finding was reported by Williams et al. (22). Non-adherers also reported receiving help from family and friends for most aspects of their treatment. This suggests that they were not as determined and motivated as the adherers, that family interactions were inhibitory, or simply that they depended on their families rather than on themselves.

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Of interest to you

Kids eat 34% more sugared cereals than 5 years ago, but fruit holds No. 1 position among lunch box items

Although for breakfast, sweet-toothed youths are having their way—children had 34% more eatings of presweetened cereals in 1987 than 5 years before—their lunches are more likely to contain fruit than cookies or even peanut butter and jelly sandwiches.

MRCA Information Services' new Special Topic Report, "Kids 2-12: Consumers On The Rise," looks at children's food and beverage consumption. The report is based on two nationally representative samples, each comprising more than 5,000 persons, including about 900 children, in 2,000 U.S. households. Other findings include:

- Parents may be controlling children's love for candy and gum, since consumption of these sweets dropped 18% during the last 5 years.
- Children in one-child households ate somewhat more sophisticated and expensive foods, such as yogurt, pasta salad, nuts, ham, bacon, grapes, plums, cheese, and cottage cheese, primarily because parents in smaller households had more money to spend on food.
- Children's consumption of breakfast and dessert items was markedly higher, by 29% and 25%, respectively, than the average American's.
- Milk accounted for 50% of children's total away-from-

home beverage consumption, mostly at school lunches.

- Children's food preferences away from home, not surprisingly, included disproportionately high frequency of eatings of "fast foods" such as French fries, pizza, hamburgers, hot dogs, fried chicken, and carbonated beverages.

"Children ate more unsweetened cereal than presweetened last year, but growth in presweetened seems certain to overtake unsweetened as the leader in market share," said Edmond Mozes, Vice President of MRCA's Menu Census Service. Overall, cold cereals accounted for 35% of non-beverage breakfast eatings and were by far the most popular in-home breakfast food for children. "Ready-to-eat, cold cereals allow youngsters the autonomy of fixing their own meal, and appeal to parents as a convenient food choice," Mozes explained.

Equally convenient, fruit was the most popular in-home lunch food and also was the most popular choice for children's carried lunches. Mozes questioned, "Is fruit the 'top banana' among children, or only a healthy pick made by Mom or Dad? I wonder how often Susie carries her apple to school only to discard it or trade it for Johnny's chocolate cake."