

Diabetes and diet: food choices

CENTRALE LANDBOUWCATALOGUS



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PROEFSCHRIFT

ter verkrijging van de graad van
doctor in de landbouwwetenschappen,
op gezag van de rector magnificus,
dr. H.C. van der Plas,
in het openbaar te verdedigen
op woensdag 7 juni 1989
des namiddags te vier uur in de aula
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BIBLIOTHEEK
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WAGENINGEN

Het Diabetes Project waarvan de studies, die in dit proefschrift worden beschreven, deel uitmaken, werd financieel ondersteund door het Ministerie van Welzijn, Volksgezondheid en Cultuur en door de Landbouwuniversiteit Wageningen.

STELLINGEN

1. Mensen met diabetes leggen zichzelf onnodige en in het licht van gezonde voeding onjuiste beperkingen op in hun voedselkeuze.
(dit proefschrift)
2. Veel dieetadviezen die aan diabeten worden gegeven, zijn niet geënt op de huidige wetenschappelijke inzichten.
(dit proefschrift)
3. Voor diabeten is het volgen van het dieetadvies het moeilijkste aspect van de behandeling van diabetes.
(o.a. dit proefschrift)
4. Bij het veranderen van voedingsgewoonten moet er van uitgegaan worden dat voedsel zowel gezondheidswaarde als genotswaarde heeft.
5. Aan insuline-afhankelijke diabeten zonder overgewicht zou geen vaste hoeveelheid energie in de voeding moeten worden voorgeschreven.
6. Dieet/voedingsadviezen worden ten onrechte geïnterpreteerd in ge- en verboden.
7. Wanneer diabeten dieetadviezen niet opvolgen, is dit niet te wijten aan onvoldoende motivatie, maar aan onvoldoende kennis van het doel van het dieet en aan ontoereikende voorlichting.
8. It is much easier to change an insulin regimen than to change a person's eating habits.
Nuttal, F.Q.: J. AM. Coll. Nutr. 6, 5-9, 1987.
9. We have to remember that dietary guidelines are suggestions to help to maintain good health. They are no prescriptions to save lives; it is like saying the Ten Commandments will get you into heaven.
Kritchevsky, D.: JAOCs 6, 708-717, 1986.
10. De bijdrage aan het tot stand komen van een proefschrift van de laatstgenoemde in het voorwoord wordt onderschat.
11. Gezien de beperktheid van de Nederlandse onderzoekswereld is voor wetenschappers een verblijf in het buitenland een noodzaak.
12. Het is ergerniswekkend dat het mestoverschot van de kleine huisdieren op straat wordt gedeponeerd.
13. Het getuigt van weinig inzicht in de problemen van slachtoffers van geweldpleging als men hun alleen psycho-sociale hulp biedt en geen financiële compensatie.
14. De discussie over hoe vrouwen het opvoeden van kinderen kunnen combineren met het verrichten van betaalde arbeid toont aan dat de emancipatie van de vrouw nog niet is voltooid.
15. De discussie over hoe vrouwen het opvoeden van kinderen kunnen combineren met het verrichten van betaalde arbeid toont aan dat de emancipatie van de man nog niet is voltooid.

**aan mijn ouders
aan Chris**

DIABETES AND DIET: FOOD CHOICES

THEESIS, DEPARTMENT OF HUMAN NUTRITION, WAGENINGEN AGRICULTURAL UNIVERSITY, THE NETHERLANDS, JUNE 7 1989.

A.C. Niewind

This thesis reports on the food choices of diabetic patients. Two studies were undertaken considering the barriers these patients experience with the diabetic diet. Furthermore, the changes in food choices during the first years after the diagnosis of insulin-dependent diabetes as well as patients' food choice motives were investigated. It is concluded that despite the barriers diabetic patients experience with their diets, they are motivated to change food choices for health-related reasons on a short-term and a more long-term basis. However, the actual changes in food use patients make after being diagnosed as diabetics are only partly in agreement with the principles of the diabetic diet. Many of the changes in food use are not necessary and some are even undesirable from a nutritional perspective. It is advised that patients' understanding of the diabetic diet as well as nutrition education programmes for diabetic patients need to be improved.

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Voorwoord

De in dit proefschrift beschreven onderzoeken maken deel uit van het Diabetes Project dat sinds 1985 wordt uitgevoerd op de Vakgroep Humane Voeding van de Landbouwuniversiteit Wageningen. De Landbouwuniversiteit Wageningen en het Ministerie van Welzijn, Volksgezondheid en Cultuur leverden aan dit onderzoek financiële bijdragen. In het Diabetes Project staat de vraag centraal: Wat betekent het om niet langer te kunnen eten waar je zin in hebt, maar een dieetadvies te moeten gaan houden als gevolg van het krijgen van Diabetes Mellitus (suikerziekte) en dit advies dag in dag uit, jaar in jaar uit, te moeten volgen?

Van de vele mensen die hun bijdrage hebben geleverd aan dit proefschrift wil ik enkelen in het bijzonder noemen. In de eerste plaats wil ik mijn promotor prof. dr. J.G.A.J. Hautvast bedanken voor zijn enthousiaste begeleiding van het onderzoek en zijn vele waardevolle adviezen op praktisch en wetenschappelijk gebied, en mijn andere promotor, weliswaar wat meer 'op afstand', prof. dr. ir. N.G. Röling voor zijn zinvolle en creatieve inbreng vanuit de voorlichtingskunde. Hun bereidheid om de manuscripten, waar dan ook ter wereld, kritisch en zeer snel van commentaar te voorzien en het in mij gestelde vertrouwen heb ik zeer gewaardeerd.

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Het meest intensief heb ik samengewerkt met Roland Friele. Samen hebben we het Diabetes Project opgezet en uitgevoerd. Met veel plezier denk ik terug aan onze urenlange discussies over het onderzoek en andere zaken. Ik heb grote waardering voor zijn creatieve ideeën, enthousiasme en gezelligheid. Veel succes wens ik hem toe bij het schrijven van zijn proefschrift.

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1 Introduction

1.1. General

Changing food choices of populations in order to improve food use is currently a major issue in preventive medicine. It is recognized that food choices are difficult to change in populations with health-related problems treated with medically prescribed diets. It is even more difficult for the general population to change food choices in order to improve health status (1-3). The Diabetes Project was started in 1985 at the Department of Human Nutrition, Wageningen Agricultural University to investigate the food choices of a population required to change their food choices for health-related reasons. For our study population we chose diabetic patients. Diabetic patients are required to change their food choices, as part of their diabetic regimen. The constraints these patients experience will reveal the possibilities and impossibilities of changing food choices. The results of this study, will yield some alternative approaches to change food choices of the general public.

1.2. Diabetes Mellitus

Diabetes Mellitus is a heterogeneous metabolic disease with profound nutritional implications. Diabetic patients have a deficit of insulin utilization. According to the degree of this deficit, two types of diabetes can be distinguished: insulin-dependent diabetes and non-insulin dependent diabetes.

The two types of diabetes are differentiated by etiology, age of onset, prognosis and therapy. Insulin-dependent diabetes is characterized by a severe lack of insulin production, it starts at an early age, and affects the body for a long time. Non-insulin dependent diabetes usually starts at a later age, but its prevalence exceeds that of insulin-dependent diabetes (4).

Untreated diabetes will cause blood glucose levels to increase well above 10 mmol/l, leading to ketoacidosis. Currently, diabetes management has progressed beyond merely surviving ketoacidosis. The emphasis now lies on increasing longevity and preventing the long-term complications of diabetes, which especially affect the blood vessels and nerves. Metabolic derangements associated with poor glycemic control are a major determinant of the frequency and severity of these complications. This has been the rationale for current

attempts to maintain near-normal glycemia in patients with diabetes (5,6). To acquire near-normal glycemia, consistency in the timing of meals and appropriate food choices together with regular activity and insulin injections are of paramount importance for insulin-dependent diabetics. For non-insulin-dependent diabetic patients metabolic control may be achieved with proper food selection, weight loss and physical exercise, sometimes combined with the use of oral hypoglycemic agents. In both types of diabetes the diet has been recognized as an essential element in both the management of diabetes and in minimizing the risk of developing long-term complications.

1.3. Dietary recommendations

Nutritional recommendations for diabetic patients are still controversial (7-13). It is agreed that the energy content of the diet should result in achieving and maintaining a desirable body weight. Carbohydrate-rich diets will improve metabolic control of diabetic patients (14-16), although there is much controversy regarding the optimal carbohydrate intake (8,17). The advised amount of carbohydrates should be up to 50% of the total energy intake. Although sucrose was forbidden in the diabetic diet for a long time, today it is recognized that modest amounts of sucrose (up to 50 grams a day) are acceptable, provided it is used in combination with other nutrients (18,19). Total fat intake should be restricted to less than 30-35% of total energy intake, and cholesterol intake should not exceed 200-300 mg/day. Replacement of saturated fats with unsaturated fats may slow down the progression of atherosclerosis. The nutritional composition of the diabetic diet is similar to the diet advised for the general population by the Dutch government (20-21).

Currently, most insulin-treated diabetic patients have learned to use an exchange system, in which foods are exchanged on the basis of their carbohydrate content.

1.4. Dietary compliance

Compliance with the diabetic diet is low. It is suggested that only half of the diabetic patients comply with their dietary regimens, although measuring dietary compliance is very difficult (22-24).

Studies have pointed out the diet as the most difficult aspect of the diabetic regimen (25-30). To increase dietary adherence, McCaul et al. suggested identifying the barriers diabetic patients experience with the diet (30).

1.5. Food choices

Until very recently, the study of food choices was mainly carried out by social anthropologists. In recent years sociologists have also displayed an interest in this subject. Both social anthropologists and sociologists went from the assumption that there is a cultural basis for food choices (31). Despite the structural approach in the 1970's (32) and the more practical or materialistic approach of the 1980's (33,34), there is little explicit theoretical discussion on the approach to be used by social scientists in the study of food choices.

Among nutritionists there is consensus that more knowledge is required about the factors influencing food choices in order to acquire desired changes in food habits. Nutritionists working in this field have been focusing more on doing research than on the development of a theoretical approach to investigate food choices. The most comprehensive theory on food choices based on empirical studies was developed by Krondl and co-workers (35,36). According to Krondl the basic requirement for food choices is an available food supply. In other words, there must be food accessibility, and this depends on a complex social system. Limited food access will reduce diversity in food use and decrease the chance of a nutritionally balanced diet. Food abundance will increase the risk of excessive use of some food components. Access to a food will allow a person the opportunity to taste, evaluate and then to accept or reject a food. This process of choosing foods precedes actual food consumption. Food choice is influenced by learned motives which are based on liking for a food, emotional response to the food or factual knowledge about it. Identified motives are: taste, perceived health, convenience, familiarity, prestige and tolerance. Taste and health have been shown to be the most important motives influencing food choices (35-40). Most studies by Krondl and co-workers were carried out among healthy and elderly populations, who were not restricted in their food choices. They did not investigate food choices of subjects with medically prescribed diets nor did they carry out any study on the process of changing food choices.

1.6. Objectives of the project

Food choices are difficult to change. On the basis of the literature we assumed that recently diagnosed diabetic patients would change their food choices in response to the diagnosis of the disease and the concurrent dietary guidelines. However, as compliance is low and changing food choices is difficult, it was expected that patients would experience barriers, when changing food choices, would only be able to change their food choices to a certain extent and would likely be unable to maintain these changes over a longer period of time. Dietary barriers are assumed to be responsible for low dietary compliance. Therefore, we studied how patients cope with these barriers and whether these barriers would cause them to deviate from the diabetic diet.

More insight in this process is necessary to improve the process of changing food choices of diabetic patients.

The specific objectives of the Diabetes Project were:

- A. to identify the barriers that insulin-treated diabetic patients experience with their diets;
- B. to assess changes in food choices of recently diagnosed insulin-dependent diabetic patients;
- C. to investigate the food choice motives of recently diagnosed insulin-dependent diabetic patients;
- D. to assess the change in dietary barriers among recently diagnosed insulin-dependent diabetic patients;
- E. to compare barriers experienced by diabetic patients with different types of treatment;
- F. to identify the ways diabetic patients cope with these barriers.

This thesis is a discussion of the first three objectives. The other three objectives are dealt with in a separate thesis.

1.7. Design of the study

The barriers diabetic patients experience with their diets were identified by means of qualitative and quantitative cross-sectional studies. As the aim of the Diabetes Project included an assessment of the changes in dietary barriers and food choices, we carried out a study in which we collected information on food choice motives and on changes in dietary barriers and food choices which

had occurred during the first years after the diagnosis of diabetes from recently diagnosed insulin-dependent diabetic patients. A more uniform treatment and easier accessibility led us to the decision to select insulin-dependent diabetics above non-insulin-dependent diabetics. In this study the same participants were interviewed several times about their food choices.

A limitation of this type of study might be that the sample could be more selective than is in generally true for cross-sectional studies, especially in case of a low response rate. With this in mind, we tried to obtain a high rate of response. Another concern relates to the possible sensitizing of the subjects. The interview might cause patients to become more aware of their dietary barriers and food choices, with the subsequent chance of a change in behavior. Unfortunately there is not much to be done to prevent this. We tried to minimize this effect by carrying out the interviews in the homes of the participants, so that participants would not meet and exchange experiences. Furthermore, interviewers were expressly instructed and trained to abstain from giving any type of dietary advice, and from expressing value judgements about participants' food choices.

1.8. Subjects

The selection of subjects presented us with several problems. First of all there is no registration of diabetic patients in the Netherlands. Selecting respondents through medical specialists and/or hospitals has several disadvantages. The Department of Human Nutrition is not affiliated with any medical institution. Therefore, sampling of patients through hospitals is dependent on the recruitment process carried out by the medical specialists and thus beyond our control. Recruitment of respondents via medical specialists, may get respondents the impression that purpose of the study would be to 'control' them. Besides, non-insulin-dependent diabetic patients are rarely treated by a medical specialist.

In this study we recruited our subjects largely through the Dutch Diabetes Association. The Dutch Diabetes Association has 38,000 members, 80-90% of which is insulin-treated (41). The total number of insulin-treated diabetics in the Netherlands is approximately 100,000. It is known that most patients who have been diagnosed as insulin-dependent, are being advised by medical personnel to join the organization. An increasing percentage of the patients cancel their memberships after a few years. This suggests that any particular

member of the Dutch Diabetes Association may well be a relatively recently diagnosed diabetic.

Patients joining the Dutch Diabetes Association may be more interested in their disease. It is known that members of the Dutch Diabetes Association have more knowledge about their disease, are better educated than non-members, and that female members outnumber male members (42).

In light of the purpose of the Project, recruitment of insulin-dependent subjects through the Dutch Diabetes Association was considered the most appropriate.

The database of the Dutch Diabetes Association contains only a small fraction of the non-insulin-dependent diabetic patients in the Netherlands. Therefore, non-insulin-dependent diabetic patients were recruited through dietitians.

1.9. Outline of this thesis

This thesis consists of three parts.

Part I (chapters 2 and 3) identifies the barriers insulin-dependent diabetic patients experience with their diets. Chapter 2 presents the results of a qualitative study, in which insulin-treated diabetic patients describe these barriers. Chapter 3 is an assessment of the prevalence of the barriers identified in the previous study among 540 insulin-treated diabetic subjects. The changes in food choices among recently diagnosed insulin-dependent diabetic patients are the topic of part II (chapters 4 and 5). Chapter 4 compares food choices before and shortly after the diagnosis of diabetes. Chapter 5 presents the results of a one year follow-up study on the changes in food choices of this population.

Food choice motives and their relationship to food use are the topic of part III (chapters 6 and 7). The food choice motives and food use of insulin-dependent diabetic patients are described in chapter 6. Differences in food choice motives and food use between diabetic and non-diabetic subjects are dealt with in chapter 7.

The eighth and last chapter is a general discussion of the studies presented in this thesis.

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2 The diabetic diet: Patients' perspectives

by A.C. Niewind, R.D. Friese, J.M.P. Edema, J.G.A.J. Hautvast & N.G. Röling

ABSTRACT

The aim of this study was to identify the barriers that insulin-treated diabetic patients experience with the diabetic diet. Data were collected by means of a semi-structured questionnaire, in which respondents were requested to describe the barriers they had encountered with the diabetic diet. These respondents were 104 insulin-treated diabetic patients, all members of the Dutch Diabetes Association. They mentioned a total of 542 barriers which were classified into 10 main categories and 37 subcategories. Results show that only part of the barriers are directly related to the requirements set by the diabetic diet. Many barriers are due to the patient's strict or even incorrect interpretation of the requirements as set by the diabetic diet or to inability to adapt the dietary guidelines to his/her own hedonic, social and bodily needs. Dietary counsellors should discuss these barriers with their patients. Special attention should be paid to the patients' interpretations of the principles of the diabetic diet.

INTRODUCTION

To insulin-treated diabetic patients a diet is essential in the management of their disease. The aim of this diet is twofold. First, a distribution of the carbohydrate intake to achieve a flat and medically adequate profile of blood sugar levels. Second, a reduction in fat consumption to slow down any development and progression of long-term complications.

Therefore, this diet requires of the patient consistency in the timing of meals, as well as consistency in the amount of carbohydrates consumed with each meal. In addition it prescribes appropriate food choices according to the nutritional recommendations for diabetics (1-4). Current recommendations include a carbohydrate intake of over 50% of the total energy intake. Total fat intake should be restricted to less than 35% of total energy intake, while saturated fats should be replaced by unsaturated fats. Cholesterol intake should be restricted as well. The diet is to be adapted to the individual according to personal preference and insulin regimen. For a long time, the use of sucrose was prohibited in the diabetic diet, but today modest amounts of

sucrose are allowed, provided that the patient discounts it in his/her diet. Some caution is in order with respect to the use of alcohol, since alcohol is a hypoglycemic agent. Finally, the total energy intake should be such that it will achieve or maintain a desirable body weight.

Most studies have shown low compliance with the diabetic regimen, especially with the diabetic diet. It is estimated that only about half of the diabetic patients comply sufficiently with their dietary regimen (5-7). Studies have pointed out the diet as the most difficult aspect of the diabetic regimen (8,9-13). A variety of reasons for non-compliance with the diabetic diet have been identified for both insulin-treated and non-insulin-treated diabetic patients. These may be psycho-social, feelings of hunger, certain food preferences, special occasions, lack of material resources, lack of understanding of the diet and other people offering inappropriate foods (9,14-17).

To increase adherence to the diet McCaul et al. (18) have suggested to identify the barriers diabetic patients experience with their diets. The objective of our study was to identify these barriers.

METHODS

Design

The design of the study was a cross-sectional one using a sample of insulin-treated diabetic patients. A large number of subjects was required in order to identify all barriers experienced by the diabetic patients. Since the purpose of this study was to acquire an overview of these barriers, a convenience sample seemed suitable.

We developed a questionnaire in which we asked respondents to describe the barriers they had encountered as a result of their diets. A series of open interviews with diabetic patients on their experiences had shown barriers to be partly resulting from the requirements set by the diet, such as eating regular meals and snacks and consistency in the intake of carbohydrates with each meal. With this observation in mind a system was developed in which all barriers could be classified with minimal ambiguity. This system was developed by the first two authors. As the coding of such data tends to be susceptible to subjective interpretation, two independent judges coded all barriers according to the categorization system. Inter-coders concurrence was calculated using Kappa-value (K). K=0.78 indicating that the concurrence exceeds by 78% that to be expected on the basis of pure chance (19).

Questionnaire

The development of the questionnaire went through several stages. In its final form it had become a semi-structured questionnaire. On each page the respondents was asked to imagine certain situations and aspects of the dietary regimen that might be felt as a barrier. Next, respondents were invited to describe their own experiences. The following suggestions were made: situations at home; work, school or meetings; sports, parties or holidays; trips or vacation. Furthermore, we asked for certain foods that had been prescribed or prohibited; the regularity of eating; the amount of foods that they were required to eat; and about being hungry. Finally, we asked them to mention situations that had occurred during the past week.

During the development of the questionnaire it became apparent that some respondents disliked the idea of writing down the barriers encountered with the diabetic diet. Instead they preferred to be interviewed. Therefore, we decided to offer the option of an interview to be conducted by one of the first two authors. The introduction of this option presented the complication of having to apply two different methods in data collection. In order to minimize differences in response due to methodological differences, respondents were interviewed while phrasing the same questions from the questionnaire, only asking for clarification when the answers were unclear.

Population

A sample of diabetic patients was recruited from the patient members of the Dutch Diabetes Association (DDA). This association has 38.000 patient members, of which 80-90% are insulin-treated. A sample of 70-75 persons was considered adequate for the purpose of this study. We expected a non-response of about 40% (20) and went from the assumption that 10% would be non-insulin-treated diabetics (21). Thus a total sample of 153 persons with diabetes between the ages of 20 and 65 was randomly selected from the DDA-database. For logistical reasons the sample was restricted to the region of Wageningen. To guarantee the respondents anonymity, all mail was handled by the mailing department of the DDA. In addition to the questionnaire the mail contained a card stating that an interview would be possible as an alternative to writing down the diet-related barriers. A pre-stamped envelope was enclosed for return of the questionnaire or card.

Studies have indicated that three to four follow-ups or reminders increase the response rate (22,23). Therefore, two weeks after the date of mailing we sent

a letter to all respondents reminding them of the questionnaire. After six weeks a follow-up letter with an extra questionnaire was forwarded to each non-respondent, again followed two weeks later by a reminder. To those who did not respond to any of these four letters, another letter was sent together with a reply-card on which we asked them to state the reason(s) why they did not wish to participate in the study. Respondents could indicate one or more reasons such as: no problems with the diet, lack of time or no interest in participation.

RESULTS

We received a response from 137 out of 153 diabetic patients, or 90%. Of these, 104 were insulin-treated diabetic patients and we included all of them in the study. 33 respondents could not participate for a variety of reasons: two of them did not have diabetes while six had non-insulin-treated diabetes. Furthermore, four respondents indicated that they were too ill to participate and three persons had died before the questionnaire had reached them. Two respondents had moved and 16 informed us that they refused to participate in the study. The type of response was as follows: 72% returned the questionnaire, 18% were interviewed and 10% of the respondents returned the reply-card. On the card they had either described one or more barriers or indicated no barriers with the diabetic diet. Table 1 describes the characteristics of the 104 insulin-treated diabetics participating in the study.

Table 1. Subjects' Characteristics.

Demographic variables	N	%
Sex:		
male	50	48
female	53	51
unknown	1	1
Age:		
20-40	55	53
41-65	44	42
unknown	5	5
Duration of diabetes:		
< 10 years	45	43
> 10 years	51	49
unknown	8	8

Seventy-six of 104 insulin-treated patients (73%) reported a total of 542 barriers, ranging from 1 to 37 barriers per respondent. Twenty-eight patients (27%) reported to experience no barriers with their diets. The descriptions of the barriers were classified into 10 main categories with 37 subcategories. The main categories have been listed in Table 2 together with the frequency they were mentioned to indicate their relative prevalence.

Table 2. Barriers Experienced with the Diabetic Diet (1).

Main Category	N
1. Barriers as a consequence of required regularity of eating	81
2. General restrictions in the amount and type of foods	77
3. Restrictions in the use of specific foods	68
4. Restrictions with regard to diabetic speciality foods	61
5. Lack of dietary variety	11
6. Barriers with eating and drinking in social situations	59
7. Reactions from others in social situations	75
8. Feelings of hunger or surfeit	42
9. Disruption of normal routine/special events	29
10. General barriers	39
Total	542

(1) N=104 insulin-treated diabetic patients.

Main category 1 was the largest. This category comprises barriers experienced as a result of the diet's requirement of regular eating and snacking. Main categories 2-5 relate to barriers diabetic patients experienced regarding the use of foods, covering 40% of all barriers mentioned. These were divided into 4 main categories according to the nature of the mentioned food items. Main category 2 lists general restrictions as to type and quantity of foods felt to be prescribed or prohibited. For example, patients indicated being unable to eat whatever they preferred or being unsure about the amount of food allowed. Furthermore, this category includes barriers which arose after the patient had neglected the dietary guidelines, barriers which ranged from feelings of guilt to feelings of bodily discomfort. Main category 3 describes barriers felt because of the restrictions in the use of specific foods such as sugar and sugar-containing products; foods high in starch such as pasta, rice, potatoes, pot-pies; foods with high fat content such as bacon, sausages, meats, sauces, dressings, butter; snacks with high fat and high salt contents; fruits and vegetables; and alcoholic beverages. Main category 4 relates to barriers concerning the use of diabetic speciality foods. Patients described these products as expensive, unhealthy, poor in taste and quality. In main

category 5, the smallest one, patients indicate that they were unable to eat a variety of foods.

Many barriers (25%) are the result of eating in social situations. Main categories 6 and 7 contain barriers experienced when the patient is to adhere to the diabetic diet in the presence of other people. Main category 6 describes the patient's discontent being unable to eat the same foods or to eat at the same time when having meals or drinks with others. Main category 7 also concerns barriers regarding others. However, in this category barriers occur as a consequence of other people's reaction towards the diabetic person because of his or her special food habits. Unpleasant reactions from others had been: a complete disregard of the diabetic diet and remarks on the patient's managing of the diet. On the other hand excessive consideration was also mentioned as an unpleasant reaction.

Main category 8 consists of barriers related to feeling of bodily discomfort. Patients described feelings of hunger or thirst at times when they should refrain from eating or drinking. However, opposite feelings were also described: namely those of surfeit at times when according to the diet, the patient is to eat or drink.

The barriers mentioned in main category 9 arise when normal routine is disrupted, such as in unexpected situations or in case of special events such as trips or vacations.

Finally, main category 10 describes some general barriers such as the costs of following a diabetic diet and the feeling that the diet is a constant burden.

DISCUSSION

Up till now literature discussed only reasons for dietary non-compliance. In this study we have identified the barriers that the diabetic patients experience with their diabetic diets. These barriers are not necessarily leading to dietary non-compliance. However in this study several of the reasons for dietary non-compliance as already described in literature, have also been identified as barriers (9,14-17).

The diet for insulin-treated diabetic patients requires consistency in the timing of meals and in the amount of carbohydrates consumed with each meal. Furthermore, patients should lower their fat intake, especially of saturated fats. The barriers reflecting these aspects which are characteristic of the diabetic diet are, therefore, hard to overcome. However, many other barriers that patients experience are not typical of the diabetic diet.

Many barriers seem to be connected with the use of foods. This shows that patients may hold very strict and even incorrect interpretations of the dietary guidelines. Restrictions in the use of foods with a high starch content or total elimination of all sugary foods are not in agreement with or even contrary to the latest nutritional recommendations (1-4). These interpretations may result in excessive and unnecessary restrictions in the use of preferred foods and may detract from the hedonic quality of their diets. After all food is a source of pleasure to all humans (24).

The patient's feelings of bodily discomfort are of critical importance. Feelings of hunger could be caused by a diet which does not meet the energy requirements of the patient. Data show that patients' energy needs are frequently underestimated (25). However, lack of adaption skills on the side of the patients may result in feelings of hunger or surfeit too.

Patients also appear to experience barriers with the diabetic diet when they eat and drink in company. Obviously, diabetics wish to eat the same foods and at the same time as others. Restrictions to certain types and quantities of foods and a eating schedule different from their social environment tend to hinder the diabetic patients' social functioning. Eating is subject to certain social rules and norms and any deviation from these norms may evoke reactions from the social environment. Those reactions, although not always negatively intended, also form a set of barriers to diabetic patients. These barriers might be partly lifted when patients have achieved a better understanding of the principles of the diabetic diet. However barriers resulting from an eating schedule that is different from that of the social environment are more difficult to solve. Some have suggested that patients require additional social skills to cope with these situations (9).

Dietary adherence and the patient's feeling of well-being can be promoted by awareness on the side of the dietary counsellor and by the development of specific skills or educational planning tailored to the needs of the individual patient.

In light of the high response, the results of this study are considered representative for the group of the insulin-treated patient members of the Dutch Diabetes Association between the ages of 20-65 years. It should be recognized, though, that members of a patient organization may be more concerned about their disease than non-members. However, in light of the purpose of this study, this is not a major issue.

This study is a qualitative one and we cannot conclude how many patients actually experience the identified barriers and how frequently. We did not

attempt to investigate whether patients had received the latest nutritional recommendations for unsulin-treated diabetic patients. As many patients do not frequently visit a dietitian and because some have had diabetes for a long period of time it might very well be possible that some patients still live according to outdated dietary prescriptions. This might explain some of our findings.

The barriers found in this study are only partly a direct result of the obligations imposed by the dietary guidelines for diabetics. This suggests that with other medically prescribed diets patients experience similar barriers and that these barriers are only partially a reflection of the requirements set by the diet. These patients may also put excessive restrictions on their food choices because of their inability to adapt the diet to their social, hedonic and bodily needs.

In conclusion, the study offers an overview of the barriers regarding the diabetic diet as experienced by diabetic patients. A proportion of the barriers is characteristic of the diabetic diet itself. Many barriers are experienced because of patients' interpretations of the diet. This interpretation is either too strict or incorrect. In addition, we see inability of the patients to adapt the diet to his/her bodily, social and hedonic needs.

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Notes

1. The questionnaire is available from the authors upon request.

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3 Barriers experienced with the diet among insulin-treated diabetic patients

by A.C. Niewind, R.D. Friese, J.M.P. Edema & J.G.A.J. Hautvast

ABSTRACT

Diet has been identified as the most difficult aspect of the regimen for diabetic patients. The aim of this study was to determine the number of patients experiencing barriers with the diabetic diet as well as to describe the relationship with demographic and health-related variables. We had 540 insulin-treated diabetic patients categorize their personal diet experiences into 22 previously identified diet barriers. Patients mentioned an average of four barriers. We found that the number of barriers were significantly influenced by the variables body mass index (BMI), level of education and the prescription of an additional diet on top of the diabetic diet. Results have shown the barriers resulted from patients' incorrect knowledge and view of the diabetic diet and their inability to adapt the diet to individual bodily, hedonic and social needs. Barriers can be reduced by prescribing diabetic diets based upon recent nutritional recommendations. Also, diets with fixed energy contents should no longer be prescribed to patients who do not need to lose weight.

INTRODUCTION

The regimen for controlling insulin-treated diabetes mellitus is difficult for many patients. The patients are asked to administer insulin, to test their blood glucose levels, to get regular exercise and to follow a diabetic diet for the rest of their lives. These activities must be coordinated in order to complement each other. The purpose of these self-care activities is to normalize blood glucose levels and to reduce the onset and aggravation of complications caused by the disease.

The diet has been pointed out as the most difficult aspect of the diabetic regimen (1-5), with non-adherence being a prevalent problem (6,7). Adherence to a prescribed diet requires of the patient to learn the specific dietary principles, to change previous eating habits and to reorganize dietary activities into a new daily routine. Recently it was suggested that identification of barriers regarding self-care should be helpful towards the development of specific self-management plans to overcome these barriers (8).

Only few studies have identified reasons for dietary non-compliance or barriers experienced with the diabetic diet (2,5,9-12). In our previous study (9) using a qualitative methodology, we identified diet-related barriers among over 100 insulin-treated diabetic patients. Results showed these barriers to arise as a consequence of the required regularity in eating. In addition, patients experience hedonic barriers due to restrictions in the quantity and type of foods. Also, barriers are felt in social situations. Furthermore respondents mentioned feelings of bodily discomfort such as hunger and surfeit. Finally, costs were identified as a barrier.

The aim of this study was to assess the prevalence of the identified barriers among insulin-treated diabetic patients.

MATERIALS AND METHODS

Subjects

A sample of insulin-treated diabetic patients was recruited from the patient members of the Dutch Diabetes Association (DDA). Individuals between the ages of 20 and 65 were eligible. Participation was restricted to those members having joined the last five years. A sample of 478 persons with diabetes was required based on differences of 15% in frequency of experienced barriers between population segments and allowing a probability of type I error of 5% and type II error of 10%. Allowing for 20% non-insulin-treated members and a non-response rate of 35%, 904 patient members were randomly selected among the eligible members.

Questionnaire

The questionnaire consisted of 22 diet-related items classified into five categories and adapted with respect to the barriers identified in our previous study (9). The questionnaire was tested for comprehensiveness among diabetic patients and experts. Two items regarded regularity of eating and one item the barriers that may occur when the daily routine is disrupted. Four items referred to feelings of bodily discomfort such as feeling ill or feelings of hunger and surfeit. One item related to the costs of the diabetic diet. Eight items concerned hedonic barriers, such as being restricted in the choice of certain foods or no longer taking pleasure in eating. Six items referred to social barriers: for instance being an exception in certain social situations with respect to eating and drinking and the social environment interfering with or neglecting the patient's diet.

Patients indicated for each barrier whether or not they experienced this item as a barrier. No attempt was made to ask about the frequency of occurrence as studies have shown that frequency and severity rating of barriers are highly correlated (2,13).

Furthermore variables such as age, sex, body mass index (BMI), level of education, duration of diabetes and any diet(s) in addition to the diabetic diet were assessed, as well as the frequency of insulin administration and of self blood glucose monitoring (SBGM).

Data collection

All 904 diabetic patients received a letter explaining the study, together with the questionnaire and a pre-stamped envelope for return of the questionnaire. In addition, a card was included to be returned in case the individual would be unable or unwilling to participate. To guarantee respondents' anonymity all mail was handled by the mailing department of the DDA.

To increase the response rate we sent a reminder three and eight weeks after the questionnaire had been mailed to all respondents. In addition the DDA put an announcement in its newsletter regarding the study and urging its members to participate.

Analysis

Data were analyzed using procedures from the SPSS/PC+ statistical package. Frequencies were used to asses the number of barriers and the percentage of the population experiencing each barrier. Different subgroups of patients based on the eight demographic and health-related measures were compared on the medians of experienced barriers by use of the non parametric median test. Medians instead of means were chosen as measures of central tendency due to the apparent skewed distribution of the number of barriers.

RESULTS

Out of 904 patients approached 730 (81%) sent in the questionnaire; 43 patients returned the card stating that they could not or did not want to participate in the study. 540 out of 730 questionnaires were answered by insulin-treated diabetic patients. All others were non-insulin-treated diabetics. The number of 540 exceeded the required sample size of 478.

Table 1. Sample characteristics.*

Demographic and Health Variables

Gender (% males)	52
Age (mean yr \pm sd)	45.9 \pm 13.6
Duration of diabetes (mean yr \pm sd)	8.7 \pm 3.6
Body Mass Index (mean \pm sd)	24.3 \pm 3.6
\leq 25.00 (% of subjects)	67
25.01-30.00	27
$>$ 30.01	7
Education (% of subjects) #	
first level	20
second level, first stage	37
second level, second stage	29
third level	14

Regimen Characteristics (% of subjects)

Diabetic diet advised	
no diet	2
specific meal plan	73
sugar-free diet	40
restricted carbohydrate intake	19
restricted caloric intake	10
Advised additional diets	
limit cholesterol intake	21
limit sodium intake	7
	14
Frequency of insulin administration	
once a day	32
twice a day	53
\geq 3 times a day /using insulin pump	15
Frequency of self blood glucose monitoring	
\leq once a week	45
once a week	25
3 times a week	20
once a day or more	11

* N=540 insulin-treated diabetic patients.

first level education = primary education

second level, first stage = general education, grades 1-3

second level, second stage = general education, grades 4-6 and senior vocational training

third level = vocational colleges, university education.

Table 1 describes the characteristics of the 540 subjects: 52% were males, the average age was 45.9 yrs (range 20-65 yrs). The average duration of diabetes was 8.7 yrs (range 0.4-53.4 yrs). The average BMI was 24.3 (range 15.2-49.5). Twenty-seven percent of the population had a BMI between 25.01 and 30.00, indicating overweight. Seven percent of the population had a BMI \geq 30.01

indicating obesity (14). Education was classified according to the International Standard Classification of Education by Unesco, adapted to the Dutch educational system (15). First level education (primary education), had been completed by 20% of the subjects. Thirty-seven percent of the population had completed second level education, first stage (general education, grades 1-3). Second level, second stage education (general education, grades 4-6 and senior vocational training), had been completed by 29% of the subjects. Fourteen percent of the population had completed third level education (vocational college and university). Data are also presented on regimen as recalled by subjects in Table 1. Nearly three quarters of the population had been advised to follow a specific meal plan with 40% of the subjects indicating that they had been advised a sugar-free diet and 19% a restricted carbohydrate intake. Ten percent of all subjects stated that they had been advised to restrict their caloric intake. Additional diets had been advised to 21% of the subjects. Of these 14% had a diet to limit natrium intake and 7% to limit the intake of cholesterol. Fifty-three percent of the subjects administered insulin twice a day, while 15% did so three times a day or more or used an insulin pump. Thirty-one percent of the population carried out self blood glucose monitoring three times a week or more, with 11% of the population performing this as a daily task.

Table 2. Diabetic regimen characteristics ranked as most difficult to adhere to by insulin-treated diabetic patients.*

Diabetic regimen characteristic	Percent of population
Diabetic diet	50
Insulin administration	30
Self blood glucose monitoring	20

* N=540 insulin-treated diabetic patients.

Table 2 shows the characteristics of the diabetic regimen ranked according to perceived degree of difficulty. Fifty percent of the respondents indicated that they saw the diet as the most difficult aspect of the diabetic regimen, while 30% felt this about the administration of insulin and 20% about self blood glucose monitoring.

Figure 1 shows the total number of barriers experienced. The median number of barriers was 4 (range 0-19). Thirteen percent of the patients reported no barriers with the diabetic diet. The variables gender, age, duration of the

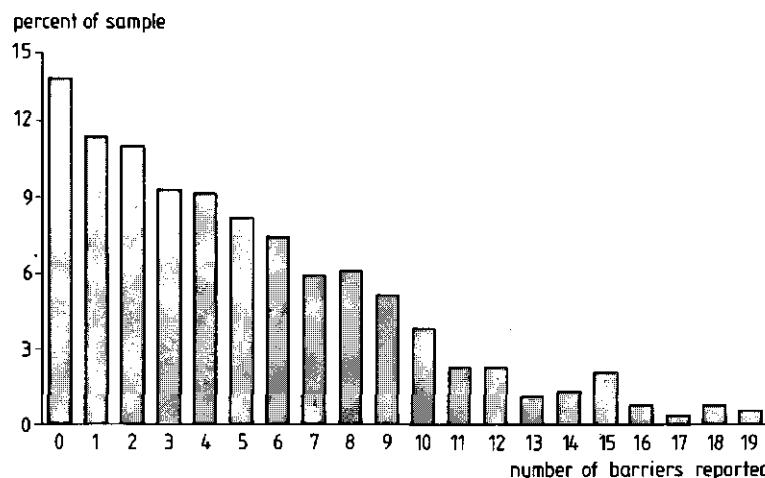


Figure 1: Percentile distribution of barriers reported by 540 insulin-treated diabetic patients.

diabetes, frequency of insulin administration and self blood glucose monitoring were found to have no significant effect on the number of barriers experienced. Significant differences were found regarding the variables BMI, level of education and additional diets (Table 3). All three BMI groups were

Table 3. The effect of level of education, body mass index and additional dietary guidelines on the number of barriers experienced.*

Variable	N	Percentage of population experiencing more than the median number of barriers #
Body Mass Index		
<25.00	346	42
25.01-30.00	138	53
>30.01	35	71
Level of education		
first and second level	455	50
third level	75	32
Advised additional diets		
yes	104	56
no	402	44

* N=540 insulin-treated diabetic patients.

Median test, ** p < 0.01, * p < 0.05.

significant different from each other with respect to the number of barriers experienced. As BMI increases patients experience more barriers. Patients with third level education appeared to experience significantly fewer barriers compared to those with primary and secondary school education. The prescription of diets in addition to the diabetic diet increased the number of barriers patients experience significantly.

Table 4. Barriers experienced by a minimum of 25% of the population*.

Category	Total Number of Barriers in Category	Items	Percent of population
Regularity of eating	3	Disruption of the daily routine makes it difficult to follow the diet	46
Bodily Discomfort	4	Feeling ill because of irregular eating	45
		Feeling hungry while not allowed to eat	38
		Feeling ill because of eating more than allowed	30
		Having to eat while not feeling hungry	25
Financial	1	The costs of the diabetic diet	42
Hedonic	8	To be allowed only small amounts of certain foods	27
		It is difficult to stay away from sweets	26
		Wanting a food excluded by the diet	25
Social	6	Others interfere with my eating	25

* N=540 insulin-treated diabetic patients.

Table 4 shows the barriers experienced by at least 25% of the population. The barrier most frequently cited was: "Disruption of the daily routine makes it difficult to follow the diet" (46%). All barriers relating to bodily discomfort were experienced by large segments of the population: "Feeling ill because of irregular eating" (45%), "feeling hungry while not allowed to eat" (38%), "feeling ill because of eating more than allowed" (30%), "having to eat while not feeling hungry" (25%). Forty-two percent of the patients mentioned the costs of the diabetic diet as a barrier. Of the eight hedonic barriers three were cited by more than 25% of the population: "To be allowed only small amounts of certain foods", "it is difficult to stay away from sweets" and "wanting a food excluded by the diet". Of the six social barriers the one that said "others interfere with my eating" was mentioned by 25% of the population.

DISCUSSION

Consistent with other studies (1-5) we found that the diabetic diet was regarded the most difficult aspect of the therapeutic regimen. As 40% of the subjects told us that they had been advised a sugar-free diet, and with 19% of the subjects having to limit their carbohydrate intake, it must be concluded that a large group of patients has been prescribed inadequate diabetic diets (16,17). It appears that these patients live according to outdated dietary prescriptions. It may be assumed that these outdated dietary prescriptions cause more barriers and increased dietary noncompliance compared to the diabetic diets which are based upon the latest nutritional recommendations. All barriers which related to feelings of bodily discomfort were frequently mentioned. The observation that patients experience feelings of hunger and surfeit is also found in other studies (10,11,18). Feelings of hunger are a powerful urge to eat for the maintenance of body weight. Data show that when diabetic patients experience feelings of hunger, they tend to disregard the diabetic diet (13). Patients, keeping normal body weight, should not experience feelings of hunger when on a diet. However when we calculated the percentage of patients experiencing feelings of hunger according to BMI, we found that 34% of the patients with a BMI < 25 experienced feelings of hunger, 41% of those who were overweight and 54% of those who were obese. Therefore, feelings of hunger are experienced by one third of the patients with normal body weight. The energy requirement of these patients are not met by the energy intake. Lean and James (19) demonstrated that routine methods used by dietitians for the estimation of a patient's energy intake, systematically lead to an underestimation of energy needs. Furthermore, the appropriateness of prescribing a fixed level of energy intake to insulin-treated diabetic patients with normal body weight is doubtful; data suggest that diabetic non-obese patients regulate their energy intake more or less like healthy individuals with normal body weight (20,21). Therefore, it should be considered to no longer prescribe a fixed energy intake to diabetic patients with normal body weight. Instead more emphasis should be put on appropriate food choices. This might considerably reduce the number of barriers patients experience with their diets.

The barrier experienced by most patients was that disruption of the daily routine makes it difficult to follow the diet. In situations of irregular eating a large segment of the population also reported feelings of bodily discomfort. This indicates that not only the requirement to eat regular meals

causes barriers but also situations where the normal routine is interrupted by the patient himself or by unexpected events. Increasing the skills to cope with these types of situations is indicated.

Diabetic diets have the reputation of being expensive. In accordance with other studies (11) we found that patients consider the diet to be costly. German data from 1978 show the costs of a diabetic diet to exceed the average cost of a normal diet by 20% (22). Currently it is generally accepted that there is no need to purchase special foods to fulfil nutritional needs. However, many patients use diabetic speciality foods and these products are more expensive than their non diabetic counterparts (23). Furthermore after the diagnosis of diabetes, patients use the more expensive lean meats more frequently than before the diagnosis of their disease (23). More attention from nutrition counsellors for low-cost foods is indicated.

Hedonic barriers were mentioned less frequently than expected based upon the results of our qualitative study (9). However, they reveal that patients feel restricted in the choice of foods, especially sweets. Currently it is accepted that sugar and sugar-containing foods can be included in the diabetic diet and that there are no 'forbidden' foods (16,17). These barriers show that patients may put excessive and unnecessary restrictions on their food choices, which may detract from the hedonic quality of their diets. This is an unfortunate phenomenon, after all food is a source of pleasure to humans.

Level of education was inversely associated with the total number of barriers experienced. Whether this relationship is causal or mediated by other variables, such as health knowledge can not be concluded from this study. Whether or not this association is causal, it appears to point at a need for more effective nutrition education for those with a low level of education. Body mass index was positively associated with total number of barriers experienced. This might reflect that overweight and obese patients should lose weight. Patients who had been prescribed diets in addition to their diabetic diet experienced more barriers than those with a diabetic diet only. This shows that any additional diet means a significant increase in the number of barriers experienced. The prescription of any additional diet needs, therefore, a critical assessment of the health situation of the patient. The study quantifies the barriers that insulin-treated diabetic patients experience with their diets. These barriers can probably be substantially reduced by prescribing diabetic diets according to the latest nutritional recommendations and by no longer prescribing a fixed energy intake to diabetic patients with normal body weight. Dietary counsellors should pay more

attention to patients' knowledge and opinions of the diabetic diet as well as their ability to adapt the diet to their own bodily, hedonic and social needs. Special attention should be paid to those with low levels of education.

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4 Changes in food choices of recently diagnosed insulin-dependent diabetic patients

by A.C. Niewind, R.D. Friele, C.Th. Kandou, J.G.A.J. Hautvast & J.M.P. Edema

ABSTRACT

Current food use as well as the habitual food use prior to the diagnosis of diabetes was measured using a food frequency questionnaire in a group of recently diagnosed insulin-dependent diabetic patients. Patients (51 M, 29 F) were between the ages of 20 and 40 and had been diagnosed as insulin-dependent diabetics less than 6 months prior to the study. Results show that patients after the diagnosis of diabetes reduce the consumption of high-sugar foods and beverages, of snacks and of high-fat foods from the dairy and meat groups and incorporate low-fat foods in their food pattern. Some of the changes have been less favorable from a nutritional perspective such as the increased consumption of diabetic speciality foods, the reduced consumption of pulses, and the lower overall food variety. In conclusion patients are able to change their food use after the diagnosis of the insulin-dependent diabetes. However to which degree patients will change their food choices on a long term basis remains to be determined.

INTRODUCTION

Over the last decade the dietary recommendations for diabetic patients have been subjected to changes. Current recommendations for insulin-dependent diabetics include consistency in meal timing, and in the amount of carbohydrates consumed with each meal. Furthermore diabetologists as well as national diabetic associations tend to recommend an increased carbohydrate intake up to approximately 50% of the total energy intake. This preferably by inclusion of foods rich in carbohydrates, foods with high fiber content and low glycemic index foods (Crapo, 1986; Mann, 1986; American Diabetes Association, 1987). They also advise to restrict fat intake, to replace saturated fats by unsaturated fats and to lower cholesterol intake in order to reduce the onset of diabetic complications. In the Netherlands patients have been advised to follow additional guidelines from the Dutch Nutrition Council for a prudent diet which recommend eating a variety of foods, a lower salt

intake and reduced alcohol consumption. For a long time sucrose was forbidden in the diabetic diet. Today it is recognised that there is no evidence that moderate amounts of sucrose (up to 50 g/day) will produce deterioration of glycemic control or blood lipid levels in insulin-dependent diabetic patients, provided that an isocaloric quantity of carbohydrate is removed from the calculated daily energy requirement (Mann, 1987).

Literature shows compliance with the diabetic diet to be generally low (West, 1973; Glanz, 1985). Diet has been described as the most difficult aspect of the diabetic regimen (Jenny, 1984; Ary et al, 1986; Glasgow, McCaul & Schafer, 1986; House, Pendleton & Parker, 1986; Jenny, 1986).

Compliance with these guidelines often demands change in food choices. The extent to which diabetic patients will be able to change their food choices according to the dietary guidelines has been disputed. Studies on patients with coronary heart disease showed a change in nutrient intake on a short as well as on a more long-term basis (Reid et al, 1984; Thuesen, Hendriksen & Engby, 1986; Reid & Mulcahy, 1987).

The purpose of this study was a documentation of the differences in the use of individual foods before and after the diagnosis of insulin-dependent diabetes in a group of young adults as well as an assessment of the concomitant nutritional implications resulting from these changes.

In this type of study food use before the diagnosis of the disease can only be assessed retrospectively. The value of retrospective dietary data depends on the validity and reproducibility of dietary assessment methods. Validation of retrospective data is rarely possible, reproducibility can be evaluated.

Therefore, we decided to investigate the reproducibility of the retrospective obtained dietary data.

METHODS

Subjects

The two criteria for selecting respondents in the study were: age ranging between 20 and 40 years and a diagnosis of insulin-treated diabetes no longer than six month prior to the study.

Individuals were recruited from the patient-members of the Dutch Diabetes Association (DDA). As the database of the DDA did not contain any information regarding the type and duration of the diabetes, all new members between ages 20 and 40 joining the DDA in the three months prior to the study were approached for participating. We received a reaction from 176 out of 187

patients approached (94%). Eighty-four of those did not meet the selection criteria and were excluded from the study. From 92 persons meeting the selection criteria 84 (91%) were willing to participate.

Food use

The aim of the study was an assessment of the changes in the use of foods, therefore the very same dietary assessment method must be used to measure food use before and after the diagnosis of the diabetes. As the interest lay in the use of foods, a food frequency was used. A food frequency questionnaire consists of a list of foods and a set of frequency response options to indicate frequency of consumption of each food during a given time period. The food list represented a cross-section of foods commonly available in the Netherlands and foods known to be used by diabetic patients (Niewind et al, 1988). It contained foods expected to be changed in frequency of use by diabetic patients after the diagnosis of diabetes. Therefore, low-fat and high-fat items were included as well as products with varying amounts of fiber.

The food list contained 177 foods subdivided into eight groups. The bread and cereal group as well as the dairy group included both 21 items. The meat and alternate group contained 27 items, and the fruit and vegetable group 43 items. Also on the list were 14 foods with high sugar content and 15 beverages. Twenty-one snack and miscellaneous items were included. In addition, the use of 15 diabetic speciality foods was assessed.

Furthermore, we asked respondents how often they used fried or grilled meats, fried or boiled fish and fried or boiled eggs.

The use of each food was assessed by means of a 9-point food frequency scale. The points of the scale were: >3 times a day, 2-3 times a day, once a day, 4-6 times a week, 2-3 times a week, once a week, 2-3 times a month, once a month and less than once a month.

Respondents were also asked which type of sweetener they used in their tea and coffee and the type of spread they used on breads: butter, margarine, low-fat margarine or margarine with high amounts of poly-unsaturated fatty acids. Also which type of fat they used for frying: butter, margarine, low-fat margarine, margarine with high amounts of poly-unsaturated fatty acids or oil. The use of these items was recorded by means of a dichotomous variable with answer categories yes/no.

Data collection

We contacted all 84 participants and explained the study to them. We sent them a self-administered questionnaire to obtain demographic data. Interviewers, trained in standardized interview techniques, and instructed to avoid value judgments about respondents' food use, collected the demographic questionnaires which they checked for missing data while at the same time they collected information on food use at the participants' homes. According to Axelson & Csernus (1983) simultaneous recall of present and retrospective intake for each food has the advantage that although respondents may not be able to remember the exact frequency of use for each time period, the relative frequency for the two periods would indicate changes that did occur in the use of foods. Therefore for each food subjects indicated the consumption of April 1987, that is after the diagnosis of the diabetes and subsequently their intake in the corresponding month of the previous year. This latter date had been chosen to avoid inaccurate data due to seasonal effects on food use. To freshen up respondent's recall of this period, we mentioned some major political and social issues which had occurred in the recall period of 1986.

Data analysis

The large sample approximation of the Wilcoxon matched pair test with corrections for tied differences was used to assess the differences in the use between 1986 and 1987 for each individual food. For zero differences the midrank $(P + 1)/2$ was assigned to the p zero differences. Half the differences received a positive midrank, half a negative midrank. The distribution of the computed z-values approaches the standard normal distribution (Marascuilo & McSweeney, 1977).

A chi-square test for homogeneity of proportions for correlated dichotomous variables, the McNemar test, was used to analyze changes in the use of sweeteners in tea and coffee as well as for the type of spread used on breads and the type of fat used for frying (Marascuilo & McSweeney, 1977).

Reproducibility of retrospective dietary data

To test the reproducibility of retrospective obtained dietary data, we contacted all respondents one year later (1988) and asked them to retrospectively report their food use of 1987. The 1988 retrospective report of 1987 and the baseline data of 1987 allowed examination of the reproducibility. Reproducibility was defined as agreement between baseline and retrospective report of 1987. Reproducibility was calculated using weighted

Kappa statistic (Cohen, 1968). Systematic differences between baseline and retrospective data were assessed by means of the Wilcoxon matched pair test with corrections for tied and zero differences.

RESULTS

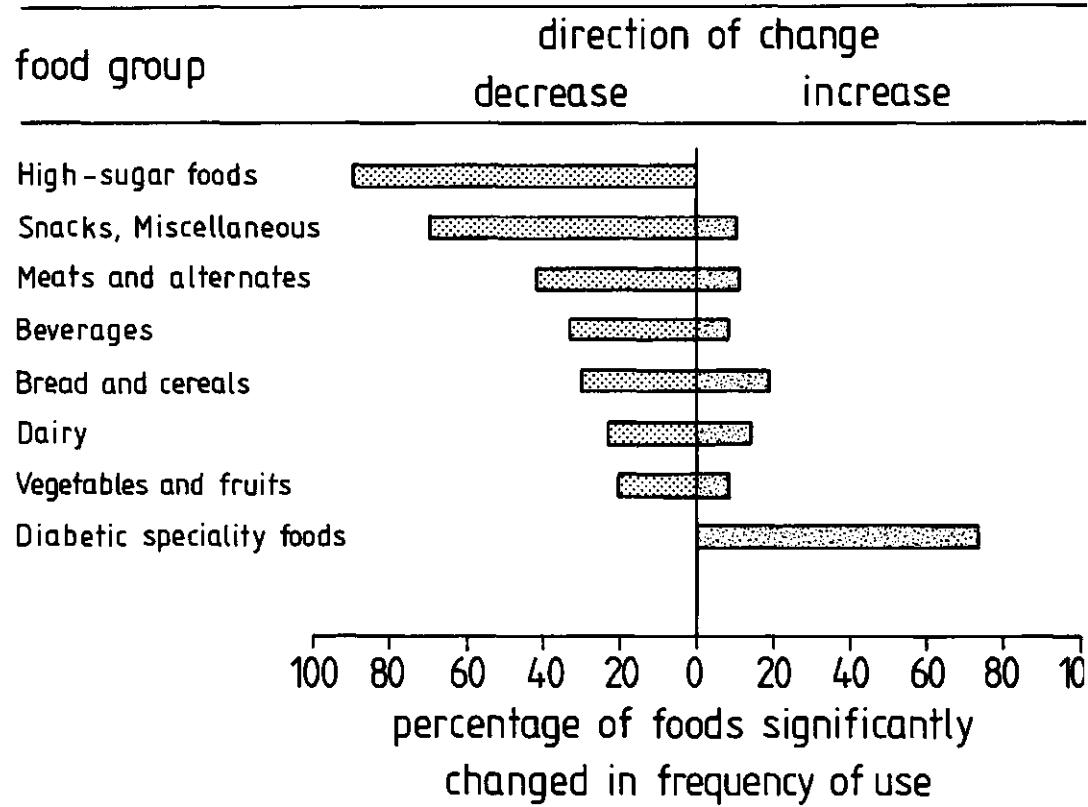


Figure 1: Percentage of foods within eight food groups changed in frequency of use post diagnosis of insulin-dependent diabetes (1,2).

1. Only foods with z-values at $p < 0.01$ are reported
2. N=80

Subjects

From the respondents willing to participate four persons were excluded from the study. Of these three were pregnant and one person had a history of glucose intolerance. Therefore, 80 patients participated in the study, 51

Foodgroup

High-sugar foods	Snacks, Miscellaneous Meats and Alternatives	Beverages	Bread and Cereals	Dairy	Vegetables and Fruits				Diabetic Speciality Foods
Foods used less frequently post diagnosis of diabetes	fruit pies yoghurt pies tarts cakes rolls small pastries ² cookies chocolates candy bars jams, jellies chocolate spread honey candy	toast snacks, deep-fried soups sausage rolls potato salad pizza quiche soup, beans peanut butter potato chips nuts salted crackers mayonnaise dipsauces vegetable sauces	minced meat, regular beef, fat wiener sate bacon pork fish, canned fish, fried fish, fat bologna, salami	bread, white buns, white liqueurs wine, sweet juices pork pork chops fish, fried fish, fat nuts	bread, white buns, white currant bread pancakes rice pasta	milk, whole chocolate milk desserts whipping cream ice cream hotch-potch canned fruits bananas applesauce			beans beans in tomato sauce potatoes, fried potatoes, mashed with carrots french fries hotch-potch bananas
Foods used more frequently post diagnosis of diabetes	vegetable snacks broth diagnosis of diabetes	beef, smoked cold cuts, lean beef, lean	mineral water	bread, whole wheat bread, brown crackers biscuits ³	milk, low-fat yoghurt, skim cottage cheese	salads apples oranges			ice cream desserts chocolate spread sweeteners jam lemonade soft drinks chocolate cakes cookies candy

1. Only foods with Z-values at ≤ 0.05 are reported.
2. Typical Dutch Foods, such as almond-filled shortbread.
3. Typical Dutch Foods, such as Evergreens and Ligia.

males en 29 females. Their age in years was 29.1 ± 5.7 (mean \pm sd). At the time of the interview the duration of the diabetes in years had been 0.33 ± 0.09 (mean \pm sd). Twenty-three percent of the participants had an elementary school education, 40% had finished high school education and 35% had university education. For 2 respondents no information regarding education was available. For 92% of the respondents insulin-dependent diabetes was the only disease they were treated for.

Food use

Figure 1 illustrates the changes in food use. For 64 foods (36%) a significant decrease was found ($p \leq 0.01$). For 27 foods (15%) a significant increase in frequency of consumption had occurred ($p \leq 0.01$). Foods with statistically significant z-values between the frequency before and after dietary treatment have been shown in Table 1.

The use of nearly all foods high in sugar (93%) showed a significant reduction in use after the diagnosis of the diabetes. Table 2 shows the percentage of the population consuming these foods with high-sugar content before and after the diagnosis of diabetes. Foods showing the highest decrease in use are: cakes, cookies, candies, chocolates and candy bars.

Table 2. Use¹ of foods high in sugar by 80 insulin-dependent diabetic patients pre and post diagnosis of diabetes.

High-sugar foods	use	
	pre diagnosis	post diagnosis
	←	→
Cakes	87	27
Cookies	82	22
Candy	77	17
Chocolates	75	17
Fruit pies	67	17
Tarts	67	19
Jams/jellies	66	24
Candy bars	66	10
Chocolate spread	65	12
Rolls	52	2
Honey	47	7
Yoghurt pies	27	10
Small pastries	24	6
Home made jams, jellies	14	6

1. More than once a month.

Seventy-one percent of the snack and miscellaneous items saw a reduced use after the diagnosis of diabetes. Nearly all these foods have high-fat and/or high-salt contents. In the meat and alternates group the frequency of use of many foods with high-fat content diminished. The same was found for beverages with high-sugar and/or alcohol level. In the bread and cereal group a drop was found in frequency of use of products with a low fiber content. Patients also reduced the frequency of use of fat and/or sweet dairy products. From the fruit and vegetable group pulses, fried potatoes, french fries and potato dishes were consumed less often as well as bananas, canned fruits and applesauce.

The largest increase occurred in the use of diabetic speciality foods. None of these foods, except sugar-free chewing gum, were used more than once a month before the diagnosis of the diabetes. However for 73% of the diabetic speciality foods a significant increase in frequency of use was found.

Artificial sweeteners, diabetic lemonade, jams, chewing gum and candies were used daily by 39, 38, 21, 16 and 15% of the population respectively. For the meat, dairy and snack groups an increased use of foods with low-fat and low-sugar content was found. Within the bread and cereal group the use of whole wheat and brown bread was increased as well as the use of crackers and biscuits. As for vegetables and fruits we found an increase in the use of salads, apples and oranges. Finally the use of mineral water was increased.

Table 3. Increased and decreased use of foods post diagnosis of insulin-dependent diabetes by 80 patients (1).

Foods	Increased use post diagnosis of diabetes	Decreased use post diagnosis of diabetes
← ————— % ————— →		
Cheese/meat snacks	24	22
Eggs	15	28
Rusk	29	14
Ginger cake	11	30
Tea	26	13
Ham	23	16
Biscuits, whole wheat	28	10
Cheese, fat	22	14
Spirits	10	26
Yoghurt, fat	14	21

1. Changing the frequency of use for one category of the food frequency scale minimally.

For 49% of the foods no significant change in use occurred. For some foods this was owing to the fact that some patients had increased the use of these foods after the diagnosis of the diabetes, while others had decreased it. The foods listed in Table 3 had changed for one category of the food frequency scale minimally by at least 35% of the population. Half of these foods were food with high-fat content from the dairy and meat group, while also gingercake, whole wheat biscuits, rusk, tea and spirits were in this category.

Food preparation

With regard to food preparation no change was observed in the frequency of use of fried and grilled meats and fried and grilled fish. Patients decreased the use of fried eggs ($p \leq 0.01$) while the use of boiled eggs did not change. A significant increase in the use of artificial sweeteners in both coffee ($p \leq 0.01$) and tea ($p \leq 0.01$) was observed. Consequently the frequency of use of sugar in these beverages was significantly decreased (both $p \leq 0.01$). For the type of spreads on bread a significant increase in the use of margarine with poly-unsaturated fatty acids ($p \leq 0.01$) was observed with a simultaneous decrease in the use of margarine and butter (both $p \leq 0.01$). The type of fats used for frying foods changed in the same way: margarine was used less ($p \leq 0.01$) while margarines with poly-unsaturated fatty acids were used more frequently ($p \leq 0.01$).

Reproducibility

Results of the reproducibility study showed that according to the classification of Landis & Koch (1977) for Kappa statistic the reproducibility was fair to very good for 72% of the foods. For 13 foods (7%) significant differences between baseline and retrospective data were found ($p \leq 0.01$). For all 13 foods the retrospective data were lower than the baseline data.

DISCUSSION

In this study we investigated the food choices of recently diagnosed insulin-dependent diabetic patients. To these patients, all between 20 and 40 years of age, the development of a chronic life-threatening illness is a major disruptive experience. As the diet is a means to control the long-term and short-term complications of this disease to a certain extent, patients recently confronted with this disease, change their food choices. For 51% of the foods as included in the food frequency food list, we found a significant

change in the frequency of use.

The changes in the food use of these patients have positive as well as negative nutritional implications. A decrease in the use of foods high in saturated fats and replacement of high-fat dairy and meat products by low-fat items is in accordance with the latest dietary guidelines. This also goes for the increased use of margarines with poly-unsaturated fatty acids (Crapo, 1986; Mann, 1986; American Diabetes Association, 1987).

A change less favorable from a nutritional point of view is the high consumption of diabetic speciality foods which might contradict the decreased use of foods with high fat content as some of these foods contain rather large amounts of fat.

The observed reduction in the consumption of foods rich in carbohydrates such as pulses and pasta is in contradiction to the official recommendations which advise patients to increase their intake of foods rich in carbohydrates and foods with a low glycemic index. This phenomenon may be explained as follows. The amount of carbohydrates allowed in a meal is prescribed in the diabetic diet. Exchange of foods is possible and based on the chemically determined amount of carbohydrates present in a food rather than in its glycemic index. In the case of legumes and pasta however, the portions allowed at each meal are very small. As a consequence patients tend to omit these foods from the diets.

Another negative development is that the number of foods decreased in use surpass the number of foods that are increased in use. This will result in a lower food variety. All current dietary guidelines emphasize that eating a variety of foods is the key to optimal nutrition, although the optimal dietary variety in food use has not yet been defined. Also humans have a need for a variety in food use while palatability declines with food patterns low in overall food variety (Siegel & Pilgrim, 1958; Kamen & Peryam, 1961).

The reduction in use of nearly all foods rich in sugar is not necessarily beneficial to the nutritional status of the insulin-dependent diabetic patient. This reduction is not necessary according to current scientific insights which allow modest amounts of sucrose in the diabetic diet (Crapo, 1986; Mann, 1986; American Diabetes Association, 1987; Mann, 1987). The reduction in high-sugar foods leads to the use of diabetic speciality foods and may decrease the palatability of the food pattern to the diabetic patient. These implications of the reduced consumption of foods high in sugar are not favorable.

It is remarkable that, although the consumption of many foods changed, no

change was reported in the preparation of meat and fish. Changing from frying meat to grilling could result in a considerable reduction in fat intake. Although the use of margarine with poly-unsaturated fatty acids for frying has increased, no change was observed for the use of oil for frying. This suggests that patients are more likely to change the type of food they eat instead of the way of preparing these foods.

The observation that some patients have increased the frequency of use of some foods while others decreased it, suggests that patients have different ideas about the characteristics of these foods. Cheese/meat snacks, eggs, ham, cheese (fat) and yoghurt (fat) all have both positive and negative health characteristics for diabetic patients. These foods contain saturated fats, a reason for a lower frequency of use. However patients may increase the use of these foods because they contain small or negligible amounts of carbohydrates. Whole wheat biscuits and rusk are foods some patients may use as a carbohydrate snack. However they also contain monosaccharides resulting in rejection by others. Patients' perceptions of the health characteristics of this category of foods warrant further attention.

In this study a food frequency questionnaire was used to assess both current and retrospective food use. Although the reproducibility was generally fair to very good, studies show that retrospective data are influenced by current measures (Beyers et al, 1983; Rohan & Potter, 1984; Møller Jensen et al, 1984; McKeown-Eyssen, Sing Yeung & Bright-See, 1986; Thompson et al, 1986; Van Staveren et al, 1986; Bakkum et al, 1988). This finding applies to situations in which the changes in food use are relatively minor. Assessing the current and the retrospective data at the same time, implies that only the changes respondents are aware of, will be reported, leading to an overestimation of the stability of the dietary pattern. However for the recall period in this study 1986-1987 a different situation applies as during that period patients consciously changed their diets. McKeown-Eyssen et al (1986) have shown that respondents who did change their food use for health reasons have a better recall of their retrospective food use than those who did not. Therefor it is likely that the retrospective report of 1986 is at least as good as the 1987 one, although an underestimation of the changes in food use during 1986-1987 may have occurred.

Changes in food use might have been overestimated as respondents have given information about food use after the diagnosis of the diabetes more on the basis of the prescription given to them than on actual dietary intake. We tried to minimize this problem by interviewing the patients about their food

use rather than using a self-administered food frequency questionnaire. We also instructed interviewers to avoid value judgments at all times. In addition, we used an extensive and specific food list. When patients give information about food use more on the basis of the prescription than on actual dietary intake, it is unlikely that they recall this information one year later. As the reproducibility of the 1987 data was fair to very good for 72% of the foods, this implies that it is unlikely that patients have recalled their dietary advice.

The overall conclusion of this study is that recently diagnosed insulin-dependent diabetic patients do make dietary changes. Some of these are consistent with the dietary guidelines for diabetic patients, while others are less favorable from a nutritional perspective. To which degree patients will change their food use on a long-term basis and whether they will be able to maintain the lower use of foods high in fat will be the subject of a follow-up study of the same population.

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5 Changes in food choices of insulin-dependent diabetic patients: one year follow-up

by A.C. Niewind, R.D. Friese, J.M.P. Edema & J.G.A.J. Hautvast

ABSTRACT

This study was carried out as a follow-up from a previous study of insulin-dependent diabetic patients (Niewind et al, 1989a). In the previous study we documented considerable changes in food use at four months after the diagnosis of the diabetes compared to before that diagnosis. Some of the changes such as a lower use of high-fat foods, were consistent with the dietary guidelines for diabetic patients, while increased use of diabetic speciality foods and the reduction in food variety were less favorable from a nutritional perspective. Seventy-two subjects (45 M, 27 F; 90% of the original group) participated in this follow-up study. Food use was assessed at 16 months after the diagnosis of diabetes by means of the same food frequency list as used in our previous study. It appeared that food use at 16 months after the diagnosis was not remarkable different from food use at four months. Favorable from a nutritional perspective was the reduction in the use of diabetic speciality foods. Unfavorable however a decrease in the use of low-fat foods from the meat, dairy and snack food groups, and the concurrent increase in use of high-fat foods. It was concluded that insulin-dependent diabetic patients had retained most of the favorable changes in food use for at least 16 months after the diagnosis of the diabetes.

INTRODUCTION

In a study on changes in food choices of recently diagnosed insulin-dependent diabetic patients, it was found that four months after the diagnosis these patients had made considerable changes in their food choices in comparison to the situation before the diagnosis of the diabetes. Patients had reduced their consumption of high-sugar foods and beverages, of fatty and salty snacks, of high-fat foods from the dairy and meat groups and of certain foods with a high carbohydrate content. They had incorporated low-fat foods and diabetic speciality foods into their food pattern. Overall the food variety had decreased. The study showed that diabetic patients make a deliberate effort to follow the dietary guidelines, although not all the changes are favorable and

necessary from a nutritional perspective (Niewind et al, 1989a). Other studies on changes in food choices have shown favorable short-term (Pietinen et al, 1984; Cole-Hamilton et al, 1986) and long-term changes in healthy subjects after dietary advice (Warwick, 1988). However, some of these studies used highly motivated subjects (Cole-Hamilton et al, 1986; Warwick, 1988). Studies investigating long-term dietary compliance in cardiac patients found generally good compliance in follow-ups at 1 year (Karvetti, 1981; Reid et al, 1984; Thuesen, Hendriksen & Engby, 1986) and even at 6 years (Reid & Mulcahy, 1987). However these studies differed considerably in intensity of dietary treatment.

There is little information about the changes in response to dietary advice in diabetic patients on a short-term and a more long-term basis. No information is available on how patients experience changes in food choices. Therefore the aim of this study was twofold. First of all to investigate whether the insulin-dependent diabetics who had participated in the previous study had maintained the favorable changes in their food choices such as a lower use of high-fat foods and abandoned the unfavorable changes such as a high use of diabetic speciality foods at one year follow-up. Secondly, to study whether patients themselves considered that they had made changes in food choices during this period and find out whether different categories of patients could be distinguished.

METHODS

Subjects

All subjects (n=80, 51 M, 29 F) who had participated in the previous study on food use before and after the diagnosis of diabetes were invited by telephone to participate in the one year follow-up on their current food use.

Food use

In our previous study of April 1987, food use was assessed by means of a food frequency questionnaire. In this study we used the same approach to determine food use as we had applied in our previous study. The study was carried out exactly one year after the previous study to avoid any distortion due to seasonal effects on food use.

The food frequency questionnaire consists of a list of foods and a set of frequency response options to indicate frequency of consumption of each food during a given time period. The food list contained 177 foods representing a

cross-section of foods commonly available in the Netherlands and foods known to be used by diabetic patients (Niewind et al, 1988). In addition, the frequency of use was assessed of fried and grilled meats, fried and boiled eggs and fried and boiled fish. The questionnaire is described in detail elsewhere (Niewind et al, 1989a).

The use of each food was assessed by means of a 9-point frequency scale. The points on the scale were: >3 times a day, 2-3 times a day, once a day, 4-6 times a week, 2-3 times a week, once a week, 2-3 times a month, once a month and less than once a month.

Respondents were also asked the type of sweetener they used in their tea and coffee and the type of spread they used on bread: butter, margarine, low-fat margarine or margarine with high amounts of poly-unsaturated fatty acids. Also the type of fat used for frying was assessed: butter, margarine, low-fat margarine, margarine with high amounts of poly-unsaturated fatty acids or oil. The use of these foods was recorded by means of a dichotomous variable with answer categories yes/no.

Self-observed changes in food choices

To examine whether patients themselves thought that they had made any changes in food choices between 1987-1988, they were asked open-ended questions. They were asked whether they had made any changes in food choices during 1987-1988, and if so, which kind of changes and what had motivated them. The effects of gender, age and education were assessed on the type of change described.

Data analysis

We used the large sample approximation of the Wilcoxon matched pair test with corrections for tied differences to assess the differences in the frequency of use between 1988 and 1987 for each individual food. For zero differences the midrank $(P + 1)/2$ was assigned to the p zero differences. Fifty percent of the differences received a positive midrank, the other 50% a negative midrank. The distribution of the computed z-values approaches the standard normal distribution.

A chi-square test for homogeneity of proportions for correlated dichotomous variables, the McNemar test, was used to analyze changes in the use of sweeteners in tea and coffee as well as the type of spread on bread and the type of fat for frying (Marascuilo & McSweeney, 1977).

RESULTS

Subjects

Of the 80 subjects approached, 72 (90%) participated in the follow-up study. Eight subjects did not participate for a variety of reasons: one subject had moved out of the country, two could not be reached or located, one was unable to participate due to severe illness and four chose not to participate in this follow-up study.

The general characteristics of the subjects of the follow-up study were: 45 males and 27 females, their age in years was 30.3 ± 5.6 (mean \pm sd), and the duration of their diabetes was 16 ± 1 months (mean \pm sd) at the time of the interview. Level of school education was classified according to the International Standard Classification of Education by Unesco, adapted to the Dutch educational system (Netherlands Central Bureau of Statistics, 1988). First level education, (primary education), had been completed by 4% of the subjects. Thirty-two percent of the population had completed second level education, first stage (general education, grades 1-3). Second level, second stage education (general education, grades 4-6 and senior vocational training) had been completed by 39% of the subjects. Twenty-five percent of the population had completed third level education (vocational college and university). For 93% of the respondents insulin-dependent diabetes was the only disease for which they were under medical treatment.

Food use

The differences in the use of foods between 4 and 16 months after the diagnosis of the diabetes are presented in Table 1. Only 32 foods (18%) had changed significantly in frequency of use, of which 10% at $p \leq 0.01$ and 8% at the $p \leq 0.05$. We found a decrease in frequency of use at 16 months for 19 foods, while for thirteen foods we found an increase in frequency of use at 16 months.

The most conspicuous change was a decrease in the use of diabetic speciality foods. We found a decrease in frequency of use at 16 months for 6 foods of this foodgroup. Four high-sugar foods were used more frequently at 16 months than at four months after the diagnosis of the diabetes: chocolate spread, cookies, fruit pie and candy.

Table 1. Differences in the use of 177 foods between 4 and 16 months after the diagnosis of the diabetes by 72 insulin-dependent diabetic patients (1).

Food group	N	4 months	Increase in food use 16 months
Diabetic speciality foods	15	chocolate** cookies** candy** jam** lemonade** soft drinks**	
High sugar foods	14		chocolate spread** cookies** fruit pie** candy*
Meats and alternates	27	cold cuts, lean** fish, lean* chicken*	fish, fried** bologna, salami* meat, canned*
Dairy foods	21	cottage cheese* buttermilk* cheese spread, skim*	
Snacks, miscellaneous	21	broth* vegetable snacks*	mayonnaise*
Bread and cereals	21	bread, brown** crackers**	bread, white** pasta*
Vegetables and fruits	43	vegetables,boiled** potatoes, boiled** oranges**	french fries* bananas*
Beverage	15		beer**

1. Only foods with z-values at $p \leq 0.05$ are reported, ** $p \leq 0.01$, * $p \leq 0.05$.

Several low-fat foods from the meat and alternates group, the dairy group and the snack and miscellaneous group saw a reduction in frequency of use during the follow-up period, while at the same time the use of high-fat foods from these food groups was increased.

The use of brown bread and crackers was higher at four months than at 16 months while the use of white bread and pasta was higher at 16 months than at four months after diagnosis of diabetes.

We found a higher consumption of boiled potatoes, boiled vegetables and of oranges at four months after the diagnosis than at 16 months, and a higher use

of french fries and bananas at 16 than at 4 months.

Finally, the consumption of beer was higher at 16 months than at four months. Table 1 suggests a decrease in food variety during this period. However, a more detailed look at dietary variety revealed a different pattern (Table 2).

Table 2. Differences in dietary variety between 4 and 16 months after the diagnosis of the diabetes in 72 insulin-dependent diabetic patients (1).

Type of dietary variety	Number of foods at		
	4 months mean \pm sd	16 months mean \pm sd	T-value (2)
Total number of foods used	68 \pm 15	70 \pm 14	1.7
Number of foods used from once a month to 2-3 times a week	52 \pm 15	57 \pm 14	4.2**
Number of foods used 4-6 times a week or more	16 \pm 4	13 \pm 4	6.6**

1. N=72 insulin-dependent diabetic patients.

2. Paired t-test, ** p < 0.01.

The overall dietary variety (defined as the total number of foods consumed over one month) (Fanelli & Stevenhagen, 1985) did not change. However, we found an increase in the number of foods used between once a month and 2-3 times a week and a decrease in the number of foods used 4-6 times a week or more. The figures show an overall tendency towards a decrease in foods used very frequently and an increase in foods used incidentally.

Food preparation

With regard to food preparation no change was observed in the frequency of use of fried and grilled meats, fried and grilled fish and fried and boiled eggs. Also no change was found in the type of sweetener used in coffee and tea, the type of spread on bread and the type of fat for frying.

Self-observed changes in food choices

Changes in food choices during this period were reported by 69% of the patients, while 31% indicated that they had not made any changes (Table 3).

Table 3. Proportion (%) of patients reporting self-observed changes in food choices during 1987-1988 (1).

Type of change in food choice	N	%
No change	22	31
Change	50	69
experimenting/ more relaxed about the diet	37	51
changed living conditions	8	11
more health-conscious	5	7

1. N=72 insulin-dependent diabetic patients.

Patients who had made changes in food choices were divided into three groups. Most of these told us that they were experimenting or had relaxed their attitude towards the diabetic diet (51%). Many of them indicated that as a result they had increased the frequency of use of high-sugar foods, high-fat foods or alcoholic beverages. Eleven percent of the patients had made changes in food choices due to a change in their living conditions such as employment status or size of the household. Seven percent of the patients indicating changes in food choices, expressed that they had become more health conscious. They indicated that compared to the year before they used more foods with a low-fat and/or high-fiber content. Patients who had reported no change in food choices during the 1987-1988 period expressed that they were satisfied with their diabetic diet and that they had felt no urge to make any changes.

Table 4. The effect of level of schooling on self-observed changes in food choices.

Type of change in food choice	School attainment first, second level N=54	third level N=18
<-----N----->		
No change	20	2
Change experimenting/ more relaxed about the diet	24	13

* Fisher's exact test, p = 0.02.

No effect of the variables gender and age on the type of self-observed food changes was found. The effect of school education on changes in food choices is shown in Table 4. The tendency to experiment with the diet was significantly more prevalent among those with highest educational attainment ($p = 0.02$).

DISCUSSION

In this follow-up study, in which 90% of the original group participated, we found only minor changes in food use. In the previous study, which assessed the changes in food use during the first few months after the diagnosis of diabetes, 51% of the foods showed a significant change in use ($p \leq 0.01$), while in this follow-up study only 18% of the foods was affected: 10% at $p \leq 0.01$ and 8% at $p \leq 0.05$. The results of the food use study show that diabetic patients just like cardiac patients are able to maintain dietary changes in food use on a long-term basis (Karvetti, 1981; Reid et al, 1984; Thuesen, Hendriksen & Engby, 1986; Reid & Mulcahy, 1987). The major changes in food use determined during the first few months and the minor changes in food use between 4 and 16 months after the diagnosis of insulin-dependent diabetes, demonstrate the strength of motivation in these patients. Other studies we carried out also show that in comparison to healthy persons insulin-dependent diabetic patients have a tendency to base their food choices on perceived health characteristics of foods, also an indication for the motivation for proper food choices among this population (Niewind et al, 1989b, Niewind et al, 1989c).

The most obvious change in food use during this follow-up study is the reduction in the use of diabetic speciality foods. Shortly after the diagnosis of diabetes, the use of these foods had become rather high, especially of sweeteners, lemonades, jams, chewing gum and candies. Diabetic speciality foods are not an essential part of the diabetic diet. Many of these foods are expensive and often are not particularly palatable. The decreased use of the diabetic speciality foods during the follow-up year seems therefore, a favorable development. The use of foods containing sucrose is increasing, although the extent of this increase is not as remarkable as the reduction in the use of diabetic speciality foods. As long as it is an accepted belief in our society that patients with diabetes should avoid all sugary foods, diabetic speciality foods may be useful for recently diagnosed diabetics. Obviously the patient will learn during the first year that the diet allows

the consumption of sucrose. As a result they will use high-sugar foods more frequently, thus reducing the frequency of use of diabetic speciality foods. However, the use of high-sugar foods is still lower than before the diagnosis of diabetes.

During the first few months after the diagnosis of the diabetes, the use of low-fat foods was increased, with a simultaneous decrease in the use of high-fat foods. The use of several high-fat foods from the meat, dairy and snack groups was higher at 16 months than at 4 months after diagnosis. At the same time the use of the low-fat foods from these food groups was decreased. This development is less favorable from a nutritional perspective (Crapo, 1986; Mann, 1986; American Diabetes Association, 1987). In order to reduce the onset and development of diabetic complications, total fat intake should be less than 30-35% of total energy intake and saturated fats should be partly replaced by unsaturated fats. The increased use of some high-fat foods might be explained as follows. For patients, high-fat foods are generally cheaper than lean foods and many patients prefer certain high-fat foods. In addition the use of high-fat foods does not result in any short-term negative health effects patients might notice. For patients, the consumption of high-fat foods has several positive effects on the short-term, while the negative effects might only be noticeable at the long-term.

In this study we used the definition by Fanelli & Stevenhagen (1985) of dietary variety and adapted it by counting the foods frequently used and the foods used incidentally during the 30-day study. The total number of foods consumed during this time did not change. However, the number of foods used very frequently decreased, suggesting a less monotonous food pattern. The number of incidentally used foods increased, which suggests an increased food variety. Among nutritionists dietary variety is highly valued, as it is supposed to be the key for optimal nutrition (Fanelli & Stevenhagen, 1985; Randall, Nichaman & Contant, 1985; Krebs-Smith, Smiciklas-Wright, Guthrie & Krebs-Smith, 1987). However, there is no agreement on the definition of dietary variety and what it includes.

The results of the study on self-observed changes in food choices showed that 51% of the population expressed having started experimenting or having become more relaxed about the diet, which especially applied to patients with high school education. The fact that some patients start experimenting with their diets and try foods banned from their food pattern for some time has also been documented by MacLean & Oram (1988). In their opinion, by experimenting with the diet the patient learns to take responsibility for his own disease. They

see experimentation with the diet as a positive development. The finding that some subjects made changes in food choices, while others did not, may explain the minor overall changes in food use. Division of the population into several subgroups and examination of the different types of change in food choices would be useful. A large sample size is required for this type of study.

In conclusion, the favorable changes in food use assessed during the first few month after the diagnosis of the diabetes have been maintained to a large extent at 16 months after the diagnosis of the diabetes. We found a minor reversal in food use during the follow-up study in the form of an increased use of high-fat foods and a decreased use of lean foods. Favorable from a nutritional perspective is the decrease in use of diabetic speciality foods at 16 months compared to 4 months after the diagnosis. Some of the patients had started experimenting with the diet by trying foods previously banned from their food pattern. We concluded that patients are motivated to change their food choices on a short-term and on a more long-term basis.

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6 Food perceptions and food use of recently diagnosed insulin-dependent diabetic patients

by A.C. Niewind, R.D. Friele, J.M.P. Edema & J.G.A.J. Hautvast

ABSTRACT

We assessed food perceptions of eight dairy products, four milk and four dairy dessert products, and the connection between food perceptions and food use in 72 recently diagnosed insulin-dependent diabetic patients. The food perceptions studied were the value of a food in light of the following aspects: general health, short-term and long-term health, taste and convenience. Perceptions were assessed by means of a Likert-type scale, use was rated on a 9-point food frequency scale. Results show the three health perceptions and the convenience perception to be closely related, indicating that patients perceive a food as either healthy or not healthy and that they do not discriminate between different health values of foods. Generally, diabetic patients tend to reject foods with high-fat and/or sugar contents because of their supposed low health values. Taste is the strongest determinant for use of those foods which from a health perspective are not rejected. The implications of these results for nutrition education for diabetic patients are discussed.

INTRODUCTION

Studies have shown that, after the diagnosis of their disease, insulin-dependent diabetic patients significantly change the frequency of use of many foods. However, not all changes in food use are beneficial and necessary from a nutritional perspective (Niewind et al., 1988). The selection of a particular food for consumption is determined by a number of learned food choice motives or food perceptions. These have been categorized by Krondl and Lau (1978) as cultural, social and personal. Others have referred to the same phenomena as 'connotative meanings' (Fewster, Bostian & Powers, 1973) or 'attributions' (Prättälä & Keinonen, 1984).

Results of several studies among healthy and elderly populations show that the food perceptions such as taste, health, convenience, familiarity, prestige and tolerance have the strongest correlations with food use, taste and health being the most important food selection determinants. Furthermore, sex and age

differences in food perceptions have been identified (Zimmerman & Krondl, 1986; Prättälä & Keinonen, 1984; George & Krondl, 1983; Krondl, Lau, Yurkiw & Coleman, 1982; Lau, Hanada, Kaminskyj & Krondl, 1979; Reaburn, Krondl & Lau, 1979).

To our knowledge, no studies have yet investigated the food perceptions of insulin-dependent diabetics or any other population with a chronic illness. The health perception of foods is supposed to be very important to patients who have been diagnosed as having a chronic illness (Krondl & Coleman, 1986). To diabetic patients health has several aspects: First of all the aspect of general health, secondly short-term health, related to the regulation of blood glucose levels and thirdly long-term health, related to the prevention of long-term diabetes complications, especially heart disease. We assumed that investigation of these three health perceptions would produce information useful to understand the process that leads to a health perception of foods. Taste, representing sensory experiences with foods, is a strong food use determinant to all individuals. As diabetic patients have to eat three main meals and three snacks containing carbohydrates during the day, the convenience perception of foods was supposed to be relevant for this group. In this paper we examined the food perceptions of general, short-term and long-term health, taste and convenience in a group of recently diagnosed insulin-dependent diabetic patients. The aim was specifically to compare the food perception profiles and use of the different foods. Information on the use of foods was utilized to clarify the possible relations between food use and food perceptions.

METHODS

Subjects

All subjects were participants in a study on food use before and after the diagnosis of their diabetes (Niewind et al., 1988). Individuals were recruited among those patient-members of the Dutch Diabetes Association who had joined the organization during the three months prior to the food use study. Of the 187 persons approached 176 (94%) were willing to participate. However, 50% of the group did not meet the selection criteria applied for the food use study. They had either non-insulin-dependent diabetes or were diagnosed as diabetics too long ago. From the 88 people who did meet the selection criteria, 72 (45 males, 27 females) participated in this study. All subjects were between 20

and 40 years of age and had been diagnosed as insulin-dependent diabetics between 14 to 18 months prior to the food use study.

Food perceptions

The foods were judged for general health, prevention of heart disease, blood glucose level control, taste and convenience. All perceptions were measured by means of a 5-point Likert-type scale, ranging from 'very good' to 'very bad'. As the aim of this study was to compare food perception profiles, a homogeneous group of foods had to be selected. We conducted a pre-test to investigate other important conditions foods should meet. Results showed that besides the above-mentioned selection criterion, a second criterion was that foods should not be eaten together with other foods, as this would create difficulties for the interpretation of food perceptions. A third condition was that foods should be consumed with varying frequencies. Finally, foods should have different nutrient profiles, meaningful to the population of the study. For diabetic patients foods should be included with different amounts of fat and/or sugar and/or starch. Dairy foods fulfilled all above-mentioned requirements. Four milk products (low-fat milk, whole milk, chocolate milk and buttermilk) and four Dutch dairy dessert products (skim yoghurt, whole yoghurt, cottage cheese and custard) were selected for the study.

Food use

To assess the use of the eight dairy products, the food frequency method was applied. This method consists of a list of foods and a set of frequency response options to indicate frequency of consumption of each food during a given time period. The use of each food was measured by means of a 9-point food frequency scale. The points on the scale were: >3 times a day, 2-3 times a day, once a day, 4-6 times a week, 2-3 times a week, once a week, 2-3 times a month, once a month and less than once a month.

Data analysis

Due to skewed data, non parametric statistics were used. To compare the food perception profiles and the use of the dairy products, the Wilcoxon matched-pair test was used with corrections for tied and zero observations. The effect of gender on food perceptions and food use as well as the effect of user-type on food perceptions were assessed by means of the Mann-Whitney test. As the sample size was larger than 30, the Z-statistic was calculated (Marascuilo & McSweeney, 1977). To determine the relationship between the five

food perceptions for each dairy product and the association between food use and food perceptions, Kendall's tau correlations were applied. In circumstances in which Kendall's tau correlation is normally used, a coefficient value in the 0.75-1.00 range would indicate a strong relationship; however, in light of the nature of this study, with numerous factors influencing food use, it was unlikely that a single factor would be found having an association with food use in this range. Therefore, in food use studies associations of 0.30 or higher are considered a relatively strong relationship (George & Krondl, 1983). All tests were done using a two-tailed test for significances.

RESULTS

The percentage of user-types of the eight dairy products are presented in Table 1. Results show significant differences in the use of the following foods ($p \leq 0.01$). Low-fat milk is used more frequently than whole milk, chocolate milk, or buttermilk. Buttermilk is used more frequently than chocolate milk. Skim yoghurt is used more frequently than whole yoghurt, custard and cottage cheese, with whole yoghurt being used more frequently than custard.

Table 1. Percentages of user types of dairy products (n=72).

Dairy Product	Users			Non-users Less than once a month
	Daily	Weekly	Monthly	
	(1)	(2)	(3)	
Low-fat milk	54	17	4	25
Buttermilk	17	8	14	61
Whole milk	3	8	10	79
Chocolate milk	-	8	3	89
Skim yoghurt	26	40	8	25
Custard	6	25	13	57
Cottage cheese	1	8	22	68
Whole yoghurt	1	13	4	82

1. at least once a day.
2. at least once a week, but not daily.
3. at least once a month, but not weekly.

The average ratings of all five perceptions for each milk product are displayed in Figure 1. Comparison of the food perception profiles revealed

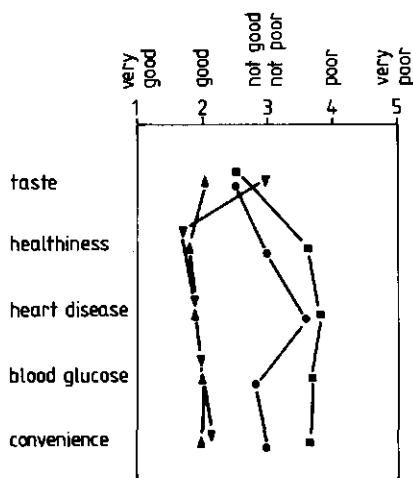


Figure 1: The average ratings (1-5) of low fat milk (▲), buttermilk (▼), whole milk (●) and chocolate milk (■) (N = 72).

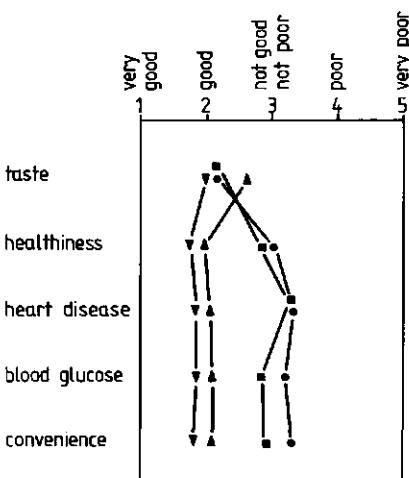


Figure 2: The average ratings (1-5) of skim yoghurt (▼), custard (●), cottage cheese (▲) and whole yoghurt (■) (N = 72).

significant differences ($p < 0.01$) for the following pairs of milk products. On all five perceptions low-fat milk is perceived of as preferable compared to whole milk. Low-fat milk is perceived as healthier, better for the prevention of heart disease and for blood glucose level control, also it is considered more convenient than chocolate milk. Buttermilk is perceived as healthier, preferable with respect to heart disease and blood glucose level control, and more convenient than both whole milk and chocolate milk. Low-fat milk is perceived as better tasting than buttermilk. Whole milk is perceived as healthier, better for blood glucose levels, and more convenient than chocolate milk.

The average ratings of all five perceptions for each dairy dessert product are displayed in Figure 2. Comparison of the food perception profiles revealed significant differences ($p < 0.01$) for the following pairs of dairy desserts. Skim yoghurt is perceived as healthier, preferable with respect to heart disease and blood glucose level control, and as more convenient than whole yoghurt and custard. Cottage cheese is perceived as healthier, preferable for heart disease prevention and blood glucose level control and as more convenient than both custard and whole yoghurt. However, whole yoghurt is perceived as better tasting than cottage cheese. Skim yoghurt is perceived as preferable for blood glucose level control, and better tasting than cottage

cheese. Whole yoghurt is perceived as preferable for blood glucose level control and more convenient than custard.

Gender differences in food perceptions were found for buttermilk, cottage cheese, skim yoghurt and custard (Table 2). Females perceived buttermilk as healthier, better for blood glucose level control and for the prevention of heart disease, and better tasting than males did. Females also perceived cottage cheese as healthier, preferable for blood glucose level control, and more convenient than males. Skim yoghurt was perceived as healthier by females as well. Males perceived custard as more preferable for blood glucose level control than females did. With respect to food use the only difference was that males used low-fat milk more frequently than females ($p < 0.05$).

Table 2. Differences between males and females in food perceptions among insulin-dependent diabetic patients (1).

Perceived as more valuable by males			Perceived as more valuable by females		
Product	Perception	Z (2)	Product	Perception	Z (2)
custard	blood glucose	2.3*	buttermilk	health	3.4**
				blood glucose	2.8**
				heart disease	2.3*
				taste	2.0*
	cottage cheese			health	2.5**
				blood glucose	2.4*
				convenience	2.3*
	skim yoghurt			health	2.4*

1. Only foods indicating a significant difference in food perceptions at $p < 0.05$ are reported.

2. Levels of significance ** $p < 0.01$; * $p < 0.05$.

Differences in food perception between users and non-users for each of the eight dairy products are shown in Table 3. Users were defined as those using the food at least once a month, and non-users as those using the food less than once a month. For foods with a small percentage of respondents in one of the two user groups, no differences in food perceptions were found, except for taste perception of low-fat milk and chocolate milk. Significant differences in food perceptions were observed for foods with a more equal distribution of users and non-users, such as buttermilk, custard and cottage cheese. For these three foods users had a higher opinion of these foods on most food perceptions compared to non-users.

Table 3. Differences in food perceptions of users and non-users (1) of dairy products among insulin-dependent diabetic patients (2).

Perceived as more valuable by non-users			Perceived as more valuable by users		
Product	Perception	z (2)	Product	Perception	z (2)
buttermilk	health	3.5**			
	blood glucose	3.5**			
	heart disease	3.0**			
	convenience	2.6**			
	taste	4.8**			
	custard	health	2.7**		
		blood glucose	3.8**		
		convenience	2.8**		
		taste	4.8**		
cottage cheese	health	3.9**			
	heart disease	3.2**			
	blood glucose	2.9**			
	taste	4.4**			
low-fat milk	taste	4.2**			
	chocolate milk	2.3*			

1. Users are those who use the food at least once a month, non-users those who use the food less than once a month.

2. Only foods indicating a significant difference in food perceptions at $p \leq 0.05$ are reported, levels of significance ** $p \leq 0.01$; * $p \leq 0.05$.

The correlations between food perceptions and food use are shown in Table 4. It is apparent that taste perceptions have the highest correlation with food use, both in terms of association (all above 0.45) and in the number of foods. The perception of general health was associated with the use of buttermilk and cottage cheese, while the blood glucose level perception related to the use of buttermilk, cottage cheese and custard. All associations were in the 0.30-0.40 range. The heart disease and convenience perceptions were associated with the use of cottage cheese only.

For each of the eight dairy products, we evaluated the relationships between perceptions of general health, heart disease, blood glucose level and convenience. Out of the 48 correlations, 40 were between 0.30 and 0.68. Correlations between taste and health perceptions of foods showed the following correlations to be higher than 0.30. The taste perception of buttermilk and cottage cheese correlated positively with the four other perceptions. Taste perception of custard correlated positively with general health and blood glucose level perceptions. For whole yoghurt, taste and blood glucose level perceptions correlated. The taste perception did not show any

significant correlation with any other perceptions for low-fat milk, whole milk, chocolate milk, and skim yoghurt.

Table 4. Food perceptions related to frequency of use of eight dairy products by insulin-dependent diabetic patients (1).

Perceptions	Dairy Product	Kendall's tau b (2)
Taste	Low-fat milk	0.47**
	Buttermilk	0.48**
	Cottage cheese	0.46**
	Custard	0.49**
Healthiness	Buttermilk	0.37**
	Cottage cheese	0.39**
Blood glucose	Buttermilk	0.36**
	Cottage cheese	0.30**
	Custard	0.40**
Heart disease	Cottage cheese	0.34**
Convenience	Cottage cheese	0.40**

1. Only correlations above 0.30 are reported.

2. Positive Kendall's tau b indicate higher use when food is perceived as more valuable, ** $p < 0.01$.

DISCUSSION

This study shows the different food perceptions measured in this study to correlate with each other. For most dairy products the perceptions of general health, short-term and long-term health, and convenience are associated. This suggests that diabetic patients perceive a food to be either healthy or not healthy and that they do not discriminate between general health, short-term health (blood glucose level) and health in the longer term (heart disease). Surprisingly, the fact whether or not a food would be convenient to use as a snack, is also considered in terms of health and not so much in terms of convenience.

For several dairy products taste perceptions correlated with the different health perceptions, suggesting that taste and health perceptions are not always independent, but that they may influence each other. If a patient likes a food, he/she also may believe it to be healthy and vice versa. As most studies have not reported any correlation between food perceptions, this

phenomenon has not yet been described in the literature.

The low-fat dairy products such as low-fat milk, buttermilk and skim yoghurt are perceived as healthier than the foods with higher amounts of fat and sugar such as whole milk, whole yoghurt and chocolate milk. Most diabetic subjects reject foods for consumption perceived as unhealthy such as whole milk, chocolate milk and whole yoghurt. However 43% of the diabetics did use custard, which contains fat and sugar. In the Netherlands, custard is a widely used dessert and there is no alternative with similar characteristics. While low-fat substitutes for whole milk and whole yoghurt are easy to get.

Therefore, it may be concluded that diabetic patients reject dairy products with high fat and/or sugar contents because of perceived unhealthiness.

However, if no suitable alternative is available, then patients will likely continue to use these foods.

For those foods that are not rejected on the basis of their perceived health characteristics, perceived taste shows a strong correlation with food use. Taste may even overrule the perceived health characteristics as shown by the food perceptions and food use pattern of cottage cheese and whole yoghurt. To define the relationship between food use and food perceptions, an assessment was made of the differences in food perceptions between users and non-users of a certain food and of the correlation between food use and food perceptions. Differences in taste perceptions between users and non-users were found for every food that was used by a substantial part of the population, with users liking the foods better than non-users. For buttermilk, custard and cottage cheese, users differed from non-users in their perception of the health values of these foods. Correlation between food use and food perceptions revealed a similar pattern: taste was the strongest determinant of food use. The slight difference between the results of the correlation data and the users versus non-users data are due to differences in the shape of the distributions of the variables involved in each of the analyses.

It could be concluded from these results that the perceived health value of a food serves to limit the available food supply for diabetic subjects, with perceived low health value being associated with food rejection. In this case, food selection would be made from the foods that do have an acceptable health value to diabetic patients, with taste being the most important food selection determinant.

Several gender differences were observed in food perceptions of foods that were used by a substantial part of the population, although food use did not differ between the sexes. These observed gender differences, with females

being more health oriented than males, are in accordance with the literature (George & Krondl, 1983). The effect of age on food perceptions could not be evaluated due to the homogeneous age distribution.

This study is one of the few which compares food perceptions and use of foods of one food group. Most studies investigating food perceptions have used rather heterogeneous foods, which made any comparison between foods problematic. Prättälä & Keinonen (1984), who investigated food perceptions of several types of sweet foods, concluded that sweet foods might be perceived rather different in spite of their similar nutrient composition. This suggests that further studies on food perceptions and food use should include foods from similar food groups in order to allow comparison between foods.

The results of this study illustrate the difficulties nutrition educators are faced with regarding the education of diabetic patients. Stressing the different health values of foods will not necessarily result in a desired change in food use. The diabetic patient uses some foods such as skim yoghurt or low-fat milk because he/she perceives them as healthy. On the other hand, some foods such as custard, may be used in spite of the fact that they are generally perceived as not very healthy. Furthermore, health value of buttermilk is perceived to equal the health value of low-fat milk. However, it is not used by many patients because of perceived low taste.

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7 Differences in food perceptions and food use between insulin-dependent diabetic and non-diabetic subjects

by A.C. Niewind, R.D. Friele, J.M.P. Edema & J.G.A.J. Hautvast

ABSTRACT

We examined differences in food perceptions and use of eight dairy products among 72 recently diagnosed insulin-dependent diabetic and 57 non-diabetic subjects. We also investigated gender differences in food perceptions and food use. The food perceptions studied were: health value, value in relation to heart disease prevention, convenience and taste. Perceptions were assessed by means of a Likert-type scale, use by means of a 9-point food frequency scale. Results showed that the frequency of use of four out of the eight dairy products differed between insulin-dependent diabetic and non-diabetic subjects, while the two groups had similar food perceptions for these foods. This suggests that the role of food perceptions on food use may be different in diabetic compared to non-diabetic subjects. Gender differences were more prominent among the non-diabetic than among the diabetic subjects. This study suggests that in order to be effective, nutrition education programs should not be based on the assumption that changed food perceptions will automatically bring the desired changes in food choices, unless health is a prevalent issue for the recipient.

INTRODUCTION

In a previous study food perception profiles were compared of eight dairy products with different nutrient compositions. Also we investigated the connection between food perceptions and food use investigated among recently diagnosed insulin-dependent diabetic patients (Niewind, Friele, Edema & Hautvast, 1989). We hypothesized that health perceptions of foods would be important food use determinants for patients who had recently been diagnosed as having a chronic illness. Therefore, several health perceptions of foods were investigated. Results showed however, that these patients perceive a food as either healthy or unhealthy. Diabetic patients reject foods with high fat and/or sugar contents because of perceived low health values. Taste is the strongest determinant of food use for foods that have not been rejected on the basis of perceived health value. Furthermore, several gender differences in

food perceptions were found.

Not many studies have been carried out investigating food perceptions and food choices. These studies have shown that for healthy populations the perceptions taste, health value, convenience, familiarity, prestige and tolerance have strong correlations with food choices, with taste and health value being the most important food selection determinants. Furthermore, sex and age differences in food perceptions have been identified among healthy populations (Zimmerman & Krondl, 1986; Prättälä, Keinonen, 1984; George & Krondl, 1983; Krondl, Lau, Yurkiw & Coleman, 1982; Lau, Hanada, Kaminskyj & Krondl, 1979; Reaburn, Krondl & Lau, 1979).

In this paper, the perceptions and use of the eight dairy products of insulin-dependent diabetics are compared with those of non-diabetic subjects. Secondly an assessment was made of the effect of gender on food perceptions and food use.

METHODS

Subjects

The group of insulin-dependent diabetics consisted of 72 subjects, all participating in a previous study on food choices. All subjects were between 20 and 40 years old. Individuals were recruited from the members of the Dutch Diabetes Association. They had been diagnosed as insulin-dependent diabetics between 14 to 18 months prior to this study. The recruitment process has been described elsewhere (Niewind, et al., 1988). The non-diabetic group also participated in a study on food choices. Several criteria were applied for the recruitment of these subjects. First of all, it was important that these subjects did not follow any medically or self-prescribed diet. Furthermore, they had to be recruited from several regions in the Netherlands as the recruitment of the diabetic group was also not restricted to one particular area. Third, the education and age profiles of the non-diabetic group should resemble those of the diabetic group as closely as possible.

Table 1 describes the demographic profiles of insulin-dependent diabetic and non-diabetic groups. The non-diabetic group had more women, and the average age was slightly higher. There were no differences in level of education. The mean duration of diabetes was 16 months.

Table 1. Demographic profiles of 72 insulin-dependent diabetic and 57 non-diabetic subjects.

Variable	Diabetic subjects	Non-diabetic subjects
Gender (%)		
males	63	44
females	38	56
Age, in years (mean \pm sd)	30.3 \pm 5.6	33.2 \pm 9.5
Education (%)		
first level	3	-
second level, first stage	31	26
second level, second stage	40	47
third level	26	26
Duration diabetes, in years (mean \pm sd)	1.3 \pm 0.1	-

Food perceptions

The perceptions on which the foods were judged were their value regarding general health, heart disease, taste and convenience. All perceptions were measured on a 5-point Likert-type scale, ranging from 'very good' to 'very bad'.

The same foods as used in the previous study were selected; these were four milk products (low-fat milk, whole milk, buttermilk and chocolate milk) and four Dutch dairy dessert products (skim yoghurt, whole yoghurt, custard and cottage cheese).

Food use

To assess the use of the eight dairy products the food frequency method was applied. This method consists of a list of foods and a set of frequency response options to indicate frequency of consumption of each food during a given time period. The use of each food was measured by means of a 9-point frequency scale. The points on the scale were: >3 times a day, 2-3 times a day, once a day, 4-6 times a week, 2-3 times a week, once a week, 2-3 times a month, once a month and less than once a month.

Data analysis

Due to skewed data, non parametric statistics were applied. The non-diabetic group had more women than the diabetic group. Therefore, the combined effect of diabetes and gender on all food perceptions and use of the eight dairy

products were assessed with the Kruskal-Wallis test, a one-way analysis of variance test for non parametric data. Four groups were defined based on the variables diabetes and gender. We applied the Mann-Whitney test to assess differences due to diabetes, gender and gender differences within the diabetic and the non-diabetic group. For sample sizes above 30 the z-statistic is computed. All tests were done using a two-tailed test for significances (Marascuilo & McSweeney, 1977).

RESULTS

The use of the eight dairy products by the diabetic and non-diabetic subjects is presented in Table 2. The mean perception ratings for each of the dairy

Table 2. Use of dairy products by 72 insulin-dependent diabetic and 57 non-diabetic subjects.

Dairy Product	Subjects	Users			Non-users Less than once a month
		Daily	Weekly	Monthly	
		(1)	(2)	(3)	
Low-fat milk	Diabetic	54	17	4	25
	Non-diabetic	38	14	9	39
Buttermilk	Diabetic	17	8	14	61
	Non-diabetic	14	14	12	60
Whole milk	Diabetic	3	8	10	79
	Non-diabetic	16	9	7	68
Chocolate milk	Diabetic	—	8	3	89
	Non-diabetic	2	18	25	56
Skim yoghurt	Diabetic	26	40	8	25
	Non-diabetic	11	46	9	35
Custard	Diabetic	6	25	13	57
	Non-diabetic	4	54	18	25
Cottage cheese	Diabetic	1	8	22	68
	Non-diabetic	—	7	21	72
Whole yoghurt	Diabetic	1	13	4	82
	Non-diabetic	7	21	13	60

1. at least once a day.
2. at least once a week, but not daily.
3. at least once a month, but not weekly.

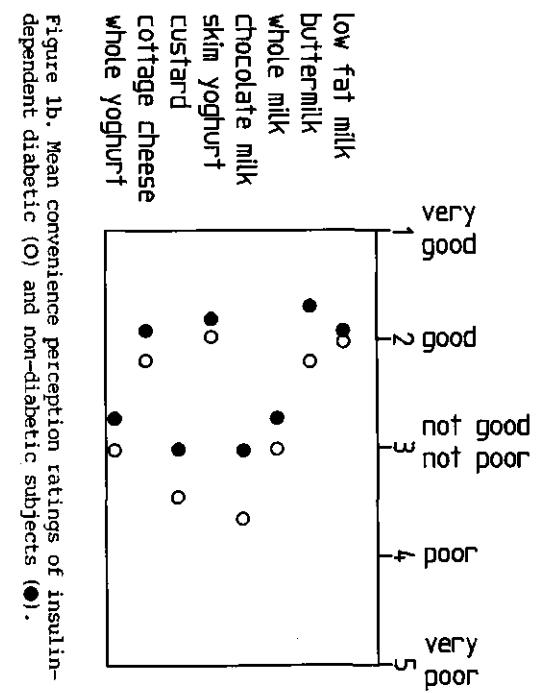
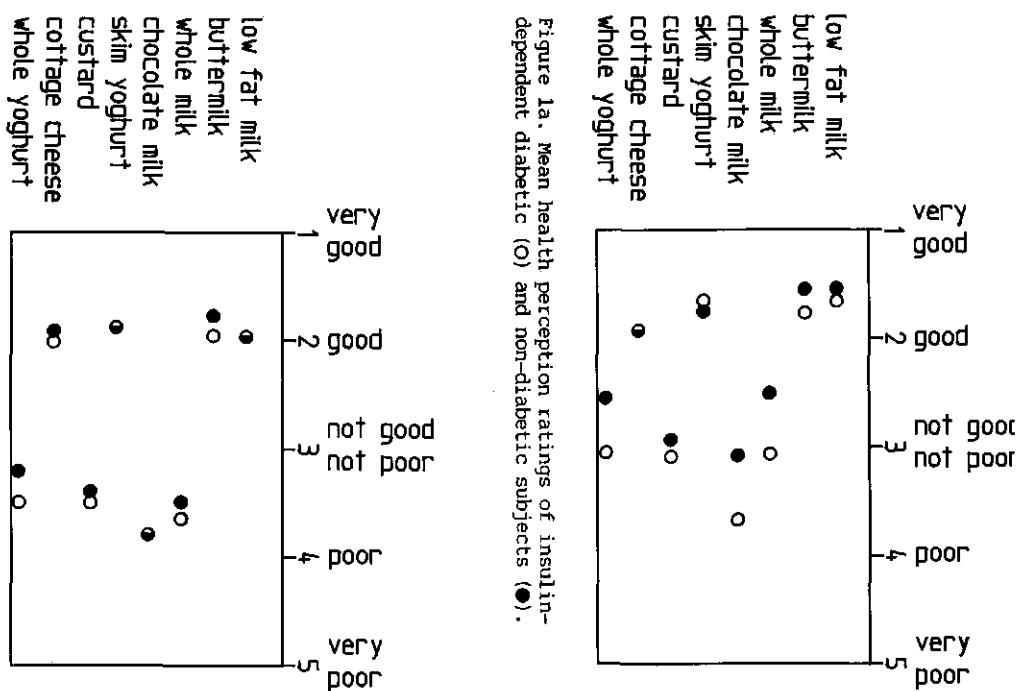


Figure 1c. Mean heart disease perception ratings of insulin-dependent diabetic (O) and non-diabetic subjects (●).

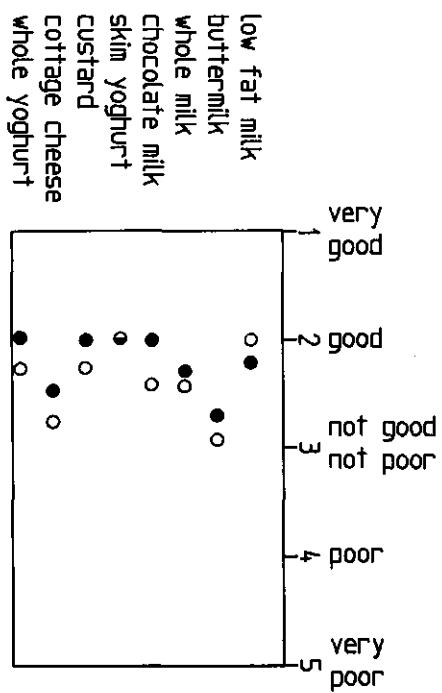


Figure 1d. Mean taste perception ratings of insulin-dependent diabetic (O) and non-diabetic subjects (●).

products for both insulin-dependent diabetic and non-diabetic subjects are displayed in Figure 1 (a-d). Both groups rated whole milk, chocolate milk, custard and whole yoghurt lower with regard to general health, value for heart disease prevention, and convenience compared to the dairy products low-fat milk, buttermilk, skim yoghurt and cottage cheese.

Table 3. The effect of diabetes and gender on food perceptions and food use of milk products among 72 insulin-dependent diabetic and 57 non-diabetic subjects.

Product	Perception	diabetes	diabetes	gender	gender	gender
		and gender			diabetic	non-
		(1)	(2)	(2)	(2)	(2)
chocolate milk	taste	NS	1.9*	NS	NS	NS
	health	11.7**	3.3**	NS	NS	NS
	heart disease	NS	NS	NS	NS	NS
	convenience	12.1**	2.8**	NS	NS	NS
	use	17.1**	4.1**	NS	NS	NS
whole milk	taste	NS	NS	NS	NS	NS
	health	14.1**	3.7**	NS	NS	NS
	heart disease	NS	NS	NS	NS	NS
	convenience	NS	1.9*	NS	NS	NS
	use	NS	NS	NS	NS	NS
buttermilk	taste	11.1**	NS	3.3**	2.0*	2.6**
	health	24.9**	2.4*	4.7**	3.4**	2.9**
	heart disease	17.4**	NS	4.1**	2.3*	3.3**
	convenience	16.4**	2.3*	3.6**	NS	3.7**
	use	9.6*	NS	3.0**	NS	2.6**
low-fat milk	taste	NS	NS	NS	NS	NS
	health	13.0**	NS	3.4**	NS	3.1**
	heart disease	NS	NS	NS	NS	2.0*
	convenience	NS	NS	NS	NS	NS
	use	NS	NS	2.1*	2.0*	NS

1. Kruskal-Wallis, one-way analysis of variance, ** $p \leq 0.01$, * $p \leq 0.05$.

2. Mann-Whitney tests, ** $p \leq 0.01$, * $p \leq 0.05$.

The effect of diabetes and gender on food perceptions and food use of the four milk products are shown in Table 3. Compared to non-diabetic subjects, diabetic subjects perceived chocolate milk to be less tasty, less healthy and less convenient. Diabetic subjects also used chocolate milk significantly less frequently than non-diabetic subjects. Diabetic subjects perceived whole milk

and buttermilk as less healthy and less convenient than non-diabetic subjects. No differences in the food perceptions and use of low-fat milk between diabetic and non-diabetic subjects were found. Gender differences were found in the food perceptions and use of buttermilk, with females perceiving it as more tasty, healthier, more valuable for heart disease prevention and more convenient than males did. Females also used buttermilk more frequently than males. Gender differences were also found for the health perception and use of low-fat milk, with females perceiving the food as healthier and using it more frequently than males did.

Table 4. The effect of diabetes and gender on food perceptions and food use of dairy dessert products among 72 insulin-dependent diabetic and 57 non-diabetic subjects.

Product	Perception	diabetes		gender	gender diabetic subjects	gender non- diabetic subjects
		(1) N=129	(2) N=129			
whole yoghurt	taste	NS	NS	NS	NS	NS
	health	NS	NS	NS	NS	NS
	heart disease	NS	NS	NS	NS	2.3*
	convenience	NS	NS	NS	NS	NS
	use	11.1**	2.8**	NS	NS	NS
custard	taste	NS	NS	NS	NS	NS
	health	NS	NS	NS	NS	NS
	heart disease	NS	NS	NS	NS	NS
	convenience	8.8*	2.0*	NS	NS	2.4*
	use	10.3*	2.9**	NS	NS	NS
skim yoghurt	taste	NS	NS	NS	NS	2.1*
	health	22.4**	NS	4.4**	NS	3.8**
	heart disease	10.7**	NS	2.6**	NS	3.3**
	convenience	16.2**	NS	3.6**	NS	3.8**
	use	8.1*	2.2*	NS	NS	NS
cottage cheese	taste	9.9*	NS	2.9**	NS	3.4**
	health	15.1**	NS	3.7**	2.5**	3.5**
	heart disease	12.0**	NS	3.1**	NS	3.3**
	convenience	16.8**	NS	3.8**	2.3*	3.2**
	use	NS	NS	2.5**	NS	2.0*

1. Kruskal-Wallis, one-way analysis of variance, ** p < 0.01, * p < 0.05.

2. Mann-Whitney tests, ** p < 0.01, * p < 0.05.

The effect of diabetes and gender on the food perceptions and use of the four dairy dessert products (Table 4) indicated differences in the use of whole yoghurt, custard and skim yoghurt between diabetic and non-diabetic subjects. Diabetic subjects used whole yoghurt and custard less frequently than non-diabetic subjects and skim yoghurt more frequently, and they perceived custard as less convenient. Gender differences were found for skim yoghurt and cottage cheese. Females perceived skim yoghurt as better tasting, healthier, more valuable for heart disease and more convenient. Females perceived cottage cheese as more valuable on all perceptions and also used it more frequently. Gender differences in food perceptions were more prevalent in the non-diabetic group than the group.

DISCUSSION

This study demonstrates that insulin-dependent diabetic and non-diabetic subjects have similar perceptions of low-fat milk, skim yoghurt, cottage cheese, whole yoghurt and custard. Differences in health and convenience perceptions were found for whole milk, chocolate milk and buttermilk. Differences in use between the two groups were found for chocolate milk, whole yoghurt, custard and skim yoghurt. Diabetic patients consume chocolate milk, custard and whole yoghurt less frequently, and skim yoghurt more frequently. Generally, the differences in food choices between the two groups could not be explained by differences in food perceptions, while differences in food perceptions did not result in differences in food choices. Only the differences in the food perceptions of chocolate milk between the diabetic and the non-diabetic group are related to the differences in the frequency of use of this food.

In our previous study we found that diabetic patients generally tend to reject dairy products with high-fat and/or sugar contents. We hypothesized that the reasons for this rejection were the perceived low health values of these foods. The results of this study show that diabetic and non-diabetic subjects differ in the frequency of use of chocolate milk, whole yoghurt, custard and skim yoghurt, with diabetic subjects compared to non-diabetic subjects using chocolate milk, whole yoghurt and custard less frequently and skim yoghurt more frequently. Both groups of subjects evaluated the perceptions of these foods similarly, and perceived chocolate milk, whole yoghurt and custard as having low health values. This suggests that the role of food perceptions on food choices may be different in diabetic compared to non-diabetic subjects.

For diabetic subjects the fact that they have a chronic illness, may be a motive that is of special influence on food choices. Thus, foods which are perceived as having low health values would be used less often. Non-diabetic subjects perceiving a food having a low health value would not automatically reduce the frequency of use of this food.

Food choices are influenced by many factors; perceived health being only one of them. Studies have shown that among healthy populations, taste is a strong determinant of food choices (Krondl & Coleman, 1986; George & Krondl, 1983; Krondl, Lau, Yurkiw & Coleman, 1982). The group of non-diabetic subjects in this study is not a representative sample of healthy subjects without any diets and was also a relatively small group. Food choices and food perceptions of healthy populations obviously need more attention.

Gender differences in food perceptions and food use were observed. All foods were perceived as more healthy, tasty and convenient by females than by males. George & Krondl (1983) also described gender differences in food perceptions and food use, with females being more health-oriented than males.

Analysis of variance showed that gender differences apply more to foods with low amounts of fat and sugar, such as buttermilk, low-fat milk, skim yoghurt and cottage cheese, with females perceiving these foods as more healthy than males. Differences due to diabetes apply to foods with relatively high amounts of fat and sugar such as chocolate milk, custard and whole yoghurt, with diabetic patients using these foods less frequently than non-diabetic subjects. Although the sample size was small, gender differences were more frequently observed among the non-diabetic subjects. This indicates that as a group, diabetic subjects have more homogeneous food perceptions than non-diabetic subjects, suggesting that nutrition counseling especially increased the health awareness in males, thus reducing the existing gender differences in healthy groups.

In our previous study we discussed the difficulties nutrition counsellors are faced with in the education of the diabetic population. This study illustrates that nutrition education programs for non-diabetic groups should not be based on the assumption that increased awareness of the health values of foods will automatically result in changes in food choices.

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8 General discussion

8.1. INTRODUCTION

The aim of the research described in this thesis was to investigate the food choices of diabetic patients.

This chapter discusses the relationships between the various projects reported in the previous chapters. First, we will outline to what extent the results of this study are generally applicable to insulin-dependent diabetic patients in light of the population studied. Secondly, we will discuss the major findings of the study with respect to food choices and the diabetic diet. Finally, we will describe the implications for nutrition education programs.

8.2. STUDY POPULATION

Respondents were recruited through the Dutch Diabetes Association. It is estimated that approximately 50% of all newly diagnosed diabetic patients join the Dutch Diabetes Association. The response rate in the study among recently diagnosed diabetic patients was 90%, which means a participation close to 50% of the people diagnosed as insulin-dependent diabetics during the recruitment period of the study. Therefore, the results of the study on food choices and food choice motives are applicable to patients who have been diagnosed as insulin-dependent diabetics. Some precautions are in order regarding the fact that patient members of the Dutch Diabetes Association are known to have more interest in their disease and have a higher educational profile than non-members (1). As long as there is no major change in dietary guidelines given to newly diagnosed insulin-dependent diabetic patients, the results of this study remain valid for insulin-dependent diabetic patients.

8.3. FOOD CHOICES

8.3.1. Barriers

Diabetic patients experience several types of barriers in relation to their prescribed diets. We identified the following barriers: feelings of bodily discomfort, the imposed regularity of eating, the costs of the diabetic diet,

and hedonic and social barriers (chapters 2 and 3). Such barriers make it difficult for diabetic patients to change food choices.

8.3.2. Motivation

After the diagnosis of the diabetes, patients change their food choices to a large extent retaining most of these for at least 16 months after the diagnosis.(chapters 4 and 5). The studies on food perceptions show that health is an important food choice motive for diabetic patients (chapters 6 and 7). This points to the strength of motivation for changing food choices among recently diagnosed insulin-dependent diabetic patients. They are motivated to change their food choices for health-related reasons on a short-term as well as on a more long-term basis.

8.3.3. Excessive food restrictions

The dietary changes which patients make after being diagnosed as diabetics are only partly in agreement with the principles of the diabetic diet (chapter 4). Some of these changes are not necessary or even undesirable from a nutritional perspective (2-4). This implies that patients perceive many more foods as unhealthy and forbidden than would be required from a nutritional perspective. Patients tend to interpret the diabetic diet in terms of prescribed and forbidden foods. This is in contradiction to recent nutritional recommendations for diabetic patients that state that there is no such thing as a 'forbidden' food.

8.3.4. Education

Level of education was inversely associated with the total number of barriers experienced (chapter 3). Also we found that those patients with high school education are the ones who start experimenting with the diabetic diet (chapter 5). This shows that level of school education may influence patients food choices. It cannot be concluded whether this relationship is causal or mediated by other variables, such as health knowledge.

8.3.5. Implications for the study of food choices

Krondl showed the importance of taste and health motives on food choices (5). This research demonstrates the importance of health motives on food choices of diabetic patients. The findings also suggest that perceived health of foods serves to limit the available food supply for diabetic subjects, with low perceived health being associated with food rejection. Food selection would subsequently be made from the foods that do have an acceptable health value with taste then being the most important food selection determinant.

Among the barriers most frequently cited were feelings of bodily discomfort. This shows that it is important that the diet meets patients' physiological needs. In the literature not much attention has been paid to the physiological factors determining food choices. Further investigation into these factors is recommended.

8.4. THE DIABETIC DIET

It has become apparent from the studies described in this thesis that two issues relating to the diabetic diet are of major importance. These are the patient's understanding and knowledge of the diabetic diet and secondly, dietary counselling.

8.4.1. The patient's understanding of the diet

The two studies on dietary barriers (chapters 2 and 3) indicate together with the studies on food choices (chapters 4 and 5) that many diabetic subjects do not have a clear and up-to-date understanding of the basic principles of the diabetic diet. Many hold very strict and even incorrect interpretations of the requirements set by the diabetic diet and display an inability to adapt the dietary guidelines to their own hedonic, social and bodily needs. Dietary counsellors should see to it that the patient understands the diet and point out to the patient how the diet can be adapted to the above-mentioned needs.

8.4.2. Dietary counselling

Many diabetic patients have been prescribed inadequate diabetic diets (3,4). This can be concluded from the findings that patients indicate that they were advised to restrict carbohydrate intake and to eliminate high-sugar foods (chapter 3). It appears that these patients still live according to outdated dietary prescriptions. It may be assumed that these outdated dietary prescriptions cause more barriers and more dietary noncompliance compared to the diabetic diets which are based upon the latest nutritional recommendations.

Dietary guidelines given to diabetic patients should be based on scientific data and be as simple as possible. Any additional dietary guidelines will increase the barriers patients experience with the diet and may distract from the main requirements of the diabetic diet.

The scientific principles behind the diabetic diet are also a matter of concern. From this thesis and other studies (6-8) it has become clear that insulin-treated diabetic patients with normal body weight experience feelings of hunger. Feelings of hunger are a powerful urge to eat for the maintenance of body weight. Patients on a diabetic diet, keeping normal body weight, should not experience feelings of hunger. Obviously, the energy requirements of these patients are not met by the energy intake. Lean and James (9) demonstrated that routine methods as used by dietitians for the estimation of a patient's energy intake, will systematically lead to underestimation of energy needs. Furthermore, we would query the appropriateness of prescribing a fixed level of energy intake to insulin-dependent diabetic patients with normal body weight (10,11). Therefore, it is our suggestion not to prescribe a fixed energy intake to diabetic patients with normal body weight.

Finally, a more general remark on the dietary regimen should be made. Consistent with other studies (12-16) we found that the diabetic diet was considered the most difficult aspect of the therapeutic regimen. As all patients in this study were insulin-treated diabetics, a solution may be to adapt the insulin regimen to the person's eating habits and not vice versa. Changing an insulin regimen is much easier than changing a person's eating habits (17).

8.4.3. Dietary compliance

In the literature it is described that compliance with the diabetic diet is generally low (18-20). The results of this thesis suggest that this can be attributed to the patient misunderstanding the diabetic diet and to inappropriate dietary counselling and not to a lack of motivation on the side of the patient.

8.5. IMPLICATIONS FOR NUTRITION EDUCATION PROGRAMS

This thesis demonstrates that diabetic patients are very motivated to change their food choices on a short-term as well as on a more long-term basis. However, several issues of concern have been raised. First of all, patients regard the diabetic diet as the most difficult aspect of the therapeutic regimen, experiencing many barriers with it. Secondly, although patients are very motivated to make healthy food choices, it is frequently seen that the patient lacks understanding of the principles of the diabetic diet, which results in unnecessary and excessive food restrictions.

The results of this research have the following implications for the planning of nutrition education programs for healthy populations. First, it should be taken into account that healthy populations will not easily be made to change their food choices. The reason for this is twofold: in the first place there is the fact that barriers are the inevitable result of changing food choices plus, in second place, the absence of the strong, health-related motivation that supports the diabetic patient. Secondly, a major concern in trying to change food choices is that the receiver will easily misunderstand the message taught to them by nutrition education programs. As pointed out in this thesis, a nutrition education message may very well be interpreted in terms of 'forbidden' foods and prescribed foods, which would result in changes in food choices not aimed for by nutrition education programs. More knowledge on the standards applied by healthy populations to classify a food, and the meanings they attach to foods is urgently needed for the planning of nutrition education programs. Specifically worthwhile would be an investigation into the motives upon which a food is classified as unacceptable.

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Summary

Changing food choices of populations in order to improve food habits, is currently a major issue in preventive medicine. It is recognized that food choices are difficult to change for people with health problems who are being treated with medically prescribed diets. It is even more difficult for the general population to change food choices for improved health status (1-3). This thesis describes research on the barriers diabetic patients experience when they change their food choices, on the actual food choices and food choice motives of recently diagnosed diabetic patients.

Diabetes Mellitus is a heterogeneous metabolic disease, with profound nutritional implications. Two types of diabetes mellitus are distinguished: insulin-dependent diabetes and non-insulin dependent diabetes. These two types are differentiated by etiology, age of onset, prognosis and therapy. In this thesis the focus is on the first type of diabetes.

Diet is recognized as essential in the management of diabetes and in minimizing the risk of developing long-term complications. The amount of energy in the diet should achieve and maintain a desirable body weight. The amount of carbohydrates should ideally be up to 50% of the total energy intake. Diets high in carbohydrates improve metabolic control of diabetic patients. Although sucrose was forbidden in the diabetic diet for a long time, today it is recognized that modest amounts of sucrose (up to 50 grams a day) are acceptable, provided it is used in combinations with other nutrients. Total fat intake should be restricted to 30-35% of total energy intake and cholesterol intake should not exceed 200-300 mg/day. Replacement of saturated fats with unsaturated fats may slow down the progression of atherosclerosis (4-12).

Part I describes the barriers insulin-treated diabetic patients experience with the diabetic diet. In chapter 2 these barriers are identified. Based on the results of this study we developed a questionnaire listing 22 possible dietary barriers classified into five categories: regularity of eating, feelings of bodily discomfort, the costs of the diabetic diet, hedonic and social barriers. The prevalence of these barriers among 540 insulin-treated diabetic patients has been assessed in chapter 3. Barriers most frequently cited were feelings of bodily discomfort (being hungry), the imposed

regularity of eating and the costs of the diabetic diet. Hedonic and social barriers were mentioned less frequently.

Many of the barriers patients experience are due to the patients' own misconceptions and views of the diabetic diet and their inability to adapt the diet to individual bodily, hedonic and social needs. It is argued that barriers could be reduced by prescribing diabetic diets based upon recent nutritional recommendations, and by no longer prescribing diets with fixed energy contents to diabetic patients who do not need to lose weight.

The changes in food choices among recently diagnosed insulin-dependent diabetic patients are the central issue of part II. Chapter 4 compares food choices before and four months after the diagnosis of diabetes. In chapter 5 we looked into the question whether insulin-dependent diabetic patients change their food choices between four and 16 months after the diagnosis.

Compared to before the diagnosis considerable changes in food choices were documented at four months after the diagnosis of the diabetes. Some of the changes such as a decrease in the use of high-fat foods, were consistent with the dietary guidelines for diabetic patients. On the other hand, the increased use of diabetic speciality foods and the lower use of foods with high carbohydrate contents were less favorable from a nutritional perspective. Food choices 16 months after diagnosis of diabetes had not changed considerably from food choices at four months. Favorable from a nutritional perspective was the reduced use of diabetic speciality foods during this period. Unfavorable was the decrease in the use of low-fat foods from the meat, dairy and snack food groups, and the concurrent increase in use of high-fat foods. It was concluded that insulin-dependent diabetic patients retained most of the favorable changes in food use for at least 16 months after the diagnosis of diabetes.

Part III deals with the food choice motives (food perceptions) and their relation to food use. In chapter 6, several health, convenience and taste perceptions of eight dairy products and the connections between food perceptions and food use are investigated.

According to the results patients perceive a food as either healthy or not healthy and do not discriminate between different health values of foods. Generally, diabetic patients tend to reject dairy products with high-fat and/or sugar contents because of supposed low health values.

The food perceptions and use of the dairy products have been compared between insulin-dependent diabetic and non-diabetic subjects (chapter 7). Results showed that the frequency of use of four out of the eight dairy products differed between diabetic and non-diabetic subjects, while the two groups of subjects had similar food perceptions of these foods. The effect of food perceptions on food use may be different for diabetic in comparison to non-diabetic subjects. For diabetic subjects, the fact that they have a chronic illness may be a motive that is of special influence on food choices. Foods which are perceived as having low health values would be used less often. Non-diabetic subjects perceiving a food having a low health value would not automatically reduce the frequency of use of this food.

In the general discussion (chapter 8) the inter-connections between the various studies are discussed. It is argued that despite the barriers experienced, diabetic patients are motivated to change their food choices on a short-term as well as on a more long-term basis. The actual changes in food use patients make after being diagnosed as diabetics are only partly in agreement with the principles of the diabetic diet. Many of the changes in food use are not required while some are even undesirable from a nutritional perspective (2-4). This implies that patients perceive many more foods to be unhealthy than would be required from a nutritional perspective. With regard to the diabetic diet it is concluded that in nutrition education for diabetic patients more attention should be paid to the patient's understanding of the diabetic diet. Training the patient to adapt the diet to the individual need and changing circumstances should be part of the diabetic education program. Furthermore, dietary guidelines given to diabetic patients should be based on the latest nutritional recommendations. Dietary noncompliance is most likely due to the patient's misunderstanding of the diabetic diet and to inappropriate dietary counselling, not to a lack of motivation on the side of the patient.

The last part of this chapter discusses the implications of the research for nutrition education programmes.

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Samenvatting

Dat mensen hun voedselkeuzen veranderen, ter verbetering van de voedingsgewoonten, wordt tegenwoordig van groot belang geacht binnen de preventieve gezondheidszorg. Algemeen wordt erkend dat het veranderen van voedselkeuzen moeilijk is. Geldt dit ook voor de Nederlandse bevolking als geheel; het veranderen van voedselkeuzen is ook moeilijk voor mensen die om gezondheidsredenen een dieetadvies moeten gaan volgen (1-3).

In dit proefschrift worden verschillende onderzoeken beschreven: naar de moeilijkheden die mensen met diabetes (suikerziekte) ervaren met hun dieetadvies, de veranderingen in voedselkeuzen van mensen bij wie recentelijk insuline-afhankelijke diabetes is geconstateerd en naar de percepties (denkbeelden) die een rol spelen bij hun keuze van voedingsmiddelen.

Diabetes Mellitus is een stofwisselingsziekte met grote gevolgen voor de voeding. Er bestaan twee soorten diabetes: insuline-afhankelijke diabetes en niet insuline-afhankelijke diabetes. Deze twee typen verschillen in ethiologie, leeftijd waarop de ziekte ontstaat, prognose en therapie. In dit proefschrift gaat de aandacht volledig uit naar de eerste soort diabetes. Het diabetesdieet speelt een grote rol in de regulatie van de diabetes. Ook verkleint het dieet de kans op de gevreesde complicaties die met diabetes gepaard kunnen gaan. Het is belangrijk dat de opname van energie zodanig is dat het gewenste lichaamsgewicht wordt bereikt en gehandhaafd. Koolhydraten moeten idealiter tenminste 50 procenten van de energie leveren. Een hoge opname van koolhydraten verbetert de regulatie van de diabetes. Hoewel suiker lang verboden was voor diabeten, is volgens de huidige inzichten een suikeropname van minder dan 50 gram per dag aanvaardbaar, mits suiker wordt gebruikt in combinatie met andere voedingsstoffen. In de tegenwoordige opvattingen moet de vetopname worden beperkt tot 30 à 35 energieprocenten en mag de opname van cholesterol de 200 tot 300 mg/dag niet overschrijden. Ook veronderstelt men dat vervanging van verzadigd vet door onverzadigd vet de ontwikkeling en voortgang van atherosclerose kan beperken (4-12).

Deel I van dit proefschrift beschrijft de moeilijkheden die insuline-afhankelijke diabeten ervaren met het dieetadvies. Hoofdstuk 2 bevat een inventarisatie van deze moeilijkheden. Op grond van dit overzicht zijn 22 moeilijkheden gedestilleerd, verdeeld over vijf categorieën: regelmatig moeten eten, lichamelijke ongemakken, de kosten van het dieet, beperkingen in de

voedselkeuze en sociale moeilijkheden. De prevalentie van deze moeilijkheden werd vastgesteld bij 540 insuline-afhankelijke diabeten (hoofdstuk 3). De moeilijkheden die de ondervraagde diabeten het vaakst noemen zijn: lichamelijke ongemakken (honger hebben), moeilijkheden met regelmatig eten en de extra kosten die het dieet met zich meebrengt. De andere problemen werden minder vaak genoemd.

Veel moeilijkheden die insuline-afhankelijke diabeten ervaren met het dieetadvies ontstaan door een gebrekig inzicht in de uitgangspunten van het dieetadvies. Ook zijn diabeten vaak niet zelf in staat het dieet aan te passen aan hun behoeften en wisselende omstandigheden. De moeilijkheden met het volgen van het dieetadvies kunnen worden beperkt door alleen die dieetadviezen te geven die gebaseerd zijn op recente voedingskundige inzichten en door geen vaste hoeveelheid energie in de voeding voor te schrijven aan mensen die geen overgewicht hebben.

In deel II worden de veranderingen beschreven die optreden in voedselkeuze gedurende de eerste tijd na de diagnose van de diabetes. In hoofdstuk 4 wordt de voedselkeuze voor het optreden van de diabetes vergeleken met die, vier maanden na de diagnose. Hoofdstuk 5 behandelt de vraag in hoeverre de voedselkeuze van insuline-afhankelijke diabeten verandert tussen vier en zestien maanden na de diagnose van de diabetes.

Tussen voedselkeuze voor de diagnose van de diabetes en vier maanden erna werden grote veranderingen waargenomen. Sommige veranderingen zoals het verminderde gebruik van vette voedingsmiddelen zijn in overeenstemming met de huidige voedingskundige inzichten. Andere veranderingen zijn vanuit dit oogpunt minder gunstig, bijvoorbeeld de afname in het gebruik van koolhydraatrijke voedingsmiddelen en de toename in het gebruik van diabetesprodukten.

De voedselkeuze na het ontstaan van de diabetes bleek tamelijk stabiel te zijn. Van de verschillen die tussen vier en zestien maanden na de diagnose optraden, is de afname in het gebruik van diabetesprodukten gunstig te noemen. Als ongunstig kan de afname worden aangemerkt in het gebruik van enkele magere produkten en de toename in het gebruik van vettige voedingsmiddelen.

De conclusie van dit onderzoek luidt dat insuline-afhankelijke diabeten in staat zijn om hun voedselkeuze in positieve zin te veranderen en dit volhouden tot zeker 16 maanden na de diagnose van de diabetes.

Deel III van dit proefschrift behandelt percepties over voedingsmiddelen en de invloed hiervan op het gebruik van deze voedingsmiddelen. Hoofdstuk 6 beschrijft de percepties die de diabeten hebben over acht zuivelprodukten wat betreft gezondheid, gebruiksgemak en smaak en welke samenhang deze percepties vertonen met het gebruik van deze voedingsmiddelen. De resultaten van dit onderzoek maken duidelijk dat mensen met diabetes een voedingsmiddel waarnemen als óf gezond óf ongezond. In hun beoordeling van een voedingsmiddel maken zij geen onderscheid in de mogelijke verschillende gezondheidswaarden van zuivelprodukten. Over het algemeen gebruiken mensen met diabetes geen zuivelprodukten met veel vet en/of suiker vanwege de lage waarde die zij deze produkten toekennen voor hun gezondheid.

De percepties die mensen met insuline-afhankelijke diabetes hebben over de zuivelprodukten zijn vergeleken met die van niet diabeten (hoofdstuk 7). Deze gegevens zijn gerelateerd aan het gebruik van deze produkten. Het blijkt dat diabeten en niet diabeten over de meeste zuivelprodukten identieke percepties hebben, maar het blijkt ook dat in het geval van de helft van de zuivelprodukten de frequentie van het gebruik verschilt. De invloed van percepties op het gebruik van de voedingsmiddelen ligt bij insuline-afhankelijke diabeten en niet diabeten kennelijk anders. Het besef dat zij een chronische ziekte hebben, is er bij diabeten wellicht de oorzaak van dat zij voedingsmiddelen die zij een lage gezondheidswaardering geven, niet frequent gebruiken. Bij niet diabeten geldt veel minder dat zij voedingsmiddelen minder frequent gebruiken die zij een lage waarde voor de gezondheid toekennen.

Hoofdstuk 8 is gewijd aan de discussie over de samenhang tussen de verschillende onderzoeken. Mensen bij wie insuline-afhankelijke diabetes is vastgesteld, zijn gemotiveerd om hun voedselkeuze te veranderen zowel op de korte als op de langere termijn, ondanks de moeilijkheden die zij hierbij ondervinden. De veranderingen die diabeten maken in hun voedselkeuze na de diagnose van de diabetes zijn slechts ten dele in overeenstemming met de uitgangspunten van het moderne diabetesdieet. Veel van de veranderingen zijn onnodig en sommige zelfs onwenselijk (2-4). Het gevolg hiervan is dat mensen veel meer voedingsmiddelen als ongezond beschouwen dan strikt noodzakelijk is. De volgende conclusies zijn getrokken met betrekking tot het diabetesdieet. Voorlichtingsprogramma's voor mensen met diabetes zouden meer aandacht moeten besteden aan het vergroten van de kennis over de uitgangspunten van het dieetadvies. Meer aandacht verdient ook het aangeven van wegen hoe diabeten het dieet kunnen aanpassen aan hun eigen behoeften en wisselende omstandig-

heden. Vervolgens zouden alleen die dieetadviezen aan mensen met diabetes gegeven moeten worden die gebaseerd zijn op de laatste wetenschappelijke inzichten. Tenslotte is het niet opvolgen van dieetadviezen waarschijnlijk meer het gevolg van gebrekke voorlichting en van onvoldoende kennis die diabeten hebben van het dieetadvies, dan van een gebrek aan motivatie. Als laatste worden de consequenties van dit onderzoek voor voedingsvoorschrijfingsprogramma's besproken.

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Curriculum Vitae

Anna Catharina Niewind werd geboren op 24 januari 1957 te Naarden. Na het behalen van het gymnasium beta diploma aan het Willem de Zwijger-Lyceum te Bussum, begon zij in 1975 met de studie Voeding van de Mens aan de Landbouwuniversiteit Wageningen. Tijdens haar praktijktijd deed zij onderzoek op het gebied van overgewicht aan de 'University of Utah', Salt Lake City, USA en werkte bij het 'Health Education Center' te Pittsburgh, USA. In 1983 behaalde zij het doctoraalexamen met als hoofdvak Voedingsleer en als bijvakken Methoden en Technieken van het Sociale Onderzoek en Sociale en Economische Geschiedenis. Een beurs van de 'World University Service of Canada', stelde haar in staat onderzoek te doen naar de voedselkeuze van diverse bevolkingsgroepen aan het 'Department of Nutritional Sciences, University of Toronto', Toronto, Canada. Per 15 oktober 1985 trad zij, als wetenschappelijk assistent, in dienst bij de Vakgroep Humane Voeding van de Landbouwuniversiteit Wageningen waar het in dit proefschrift beschreven onderzoek werd verricht. Sinds 1 april 1989 is zij werkzaam bij het Ministerie van Onderwijs en Wetenschappen te Zoetermeer.