Evaluation of a diabetes knowledge and behaviour (DKB) questionnaire

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The primary prevention of type 2 (non-insulin-dependent) diabetes is now considered possible through adopting lifestyle changes. Population strategies for preventing diabetes are now being developed. The South Auckland Diabetes Project has developed a questionnaire to assess the impact of a diabetes awareness, exercise/healthy eating programme in the local communities. The questionnaire was evaluated among local adult Europeans (n=127), Maori (n=103) and Pacific Islands people (n =167). The questionnaire is interviewer-directed and takes approximately 30 min to administer. Diabetes knowledge was assessed using four open questions and 31 closed true/false questions which had good reliability (Cronbach's α range: 0.59–0.90), reproducibility (Pearson's r range: 0.39–0.74) and external validity (r range: 0.28–0.56) among all ethnic groups. Median scores increased by 7–13% on re-testing. The open and closed question scores were 7–13% and 10–26% higher respectively among those with diabetes or a family history of diabetes (n = 78).

Important dietary habits were assessed using four tools: (1) a seven-item food preparation/fat content 'fat index'; (2) a four-item high-fat/high-refined-carbohydrate score had good reliability (Cronbach's α 0.51–0.74), reproducibility (r = 0.37–0.70) and external validity when compared with a dietetic assessment (total fat r = 0.44–0.90); (3) a 12-item food frequency questionnaire based on standard portion sizes also shared good reproducibility (Pearson's r = 0.45–0.52) and correlated well with the dietetic assessment of total calories (r = 0.48–0.64) and of calories due to fat (r = 0.41–0.65), and (4) a simple question related to the frequency of fruit consumption correlated negatively with the fat index in Europeans (r = –0.25, P<0.05) and Maori (r = –0.33, P<0.01). While the questionnaire does not give a quantitative assessment of nutritional habits, it does offer a speedy tool for evaluating population-based lifestyle and diabetes awareness interventions directed at the prevention and control of type 2 (non-insulin-dependent) diabetes.

Introduction

The population of South Auckland (303 513 in 1991) includes a high proportion of Polynesians of both Maori (50 589) and Pacific Islands (47 436) descent[1]. These populations have an age-adjusted prevalence of diabetes that is up to four-fold higher than that of New Zealand Europeans[2,3]. In view of this, a diabetes awareness and education programme is being developed in an attempt to control the predicted increase in numbers of people with diabetes and its tissue damage[4]. To evaluate the programme and its pilot studies, a rapid and simple tool was needed to assess the impact of any interventions on both diabetes knowledge and lifestyle among the general population and target groups. Of particular importance was the need to ensure that the final validated questionnaire was understandable, easy to use and culturally appropriate.

We now describe the design, reliability and validity of the diabetes knowledge, nutrition, television watching habits and alcohol sections for use in a population with a high prevalence of diabetes.

Method

Development of the questionnaire

The questionnaire included eight components: demographic and socioeconomic details, diabetes knowledge, key dietary habits, exercise, smoking and alcohol habits, perceived weight and ideal weight, and anthropometric measures (weight, height, waist, hip). After the evaluation of the questionnaire , one further measure relating to 'happiness' was added. This had been validated elsewhere[5]. The exercise questions were replaced by a separate set that had previously been validated in another New Zealand population[6]. These are not reported here.

The questionnaire was interviewer-directed. The assessment of diabetes knowledge was piloted with five open questions (including those previously described[7]), a four-point and a five-point Likkert scale and 47 closed questions derived from other published diabetes knowledge questionnaires[8–12]. Questions were grouped under 10 stems with 3–6 true/false responses. The suitability of these sets of questions was discussed with members of the Maori and Pacific Islands communities prior to testing.

The final questionnaire included four open questions relating to the nature, symptoms, complications and treatment of diabetes[7], together with a four-point Likkert scale question relating to the degree of damage (and death) caused by controlled diabetes. The coding for the open questionnaire has been described previously[7]. A further 31 closed questions from seven stems covered the nature, symptoms, complications, risk factors and prevention of diabetes, and included identification of high fat and high sugar foods (see Appendix 1). In the development stage, an obvious tendency for guessing the closed questions was observed, in spite of reassurance

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that the response 'don't know' could be used. In view of this, for the definitive application, incorrect answers were assigned a negative score of –1. Correct answers were scored +1, and 'don't know' was scored 0. The total score was converted into a percentage with all negative totals scored as 0%.

The dietary questions were intended to identify changes in the type, cooking, general preparation, and frequency of a number of key foods. The initial section described qualitative habits associated with a high-fat diet, while the second section was a 12-item food frequency questionnaire designed to reflect not only the total caloric intake but also the degree to which a low-fat, low-refined-carbohydrate diet was consumed vs a high-fat, high-refined-carbohydrate diet. Important high-fat foods and other key foods were identified through discussion with four dietitians and two nutritionists with extensive experience in the clinical assessment and management of the dietary practices of the local Polynesian communities. The items were further discussed with Maori and Pacific Islands community workers. Certain foods were important only for one or two ethnic groups.

Cheese, while a major source of dietary fat among Europeans, was rarely consumed by Pacific Islands people. The complex carbohydrates consumed also differ greatly between ethnic groups (eg kumara among Maori, green bananas and taro among Pacific Islands people). Key indicators of fat consumption, likely to be of use in the evaluation of interventions were assessed with seven questions. A simple ranking system was adopted for each item ranging from 0 (recommended ie lowest fat content) to 2 (ie high fat) and a 'fat index' calculated as the sum of the ranks expressed as a proportion of twice the total number of items included. (The denominator was doubled because the top rank in the numerator items was 2). As a number of subjects did not eat some of the foods, their 'fat index' was calculated by excluding the item from both denominator and numerator. The 'fat index' was expressed as a percentage.

From the 12 items chosen for the food frequency questionnaire, three measures were derived: (1) pieces of fruit eaten per week; (2) a high-fat/high-refined-carbohydrate score (HFHRC score) taken as the number of times per week any one of the following four foods were consumed: chocolate bars, servings of ice cream, biscuits, small cake or piece of cake, and (3) relative total calories consumed per week, taken from the estimated calorific value of these eight items and from food frequency questions for eggs, chops, potatoes and slices of bread. Questions relating to alcohol consumption were developed from previous questionnaires[13]. The question relating to the number of hours of television watched was developed by the authors.

Item selection

The resulting questionnaire was piloted among 55 European, Maori and Pacific Islands volunteers from the local community, including students (n=14), diabetic patients (n=12) and clinic staff (n=8). Following the pilot, the questionnaire was found to take longer than the 20–30 min intended. Questions felt to be of least importance were therefore deleted. Problem areas within the questionnaire were identified and final modifications made. The draft and final versions were both assembled into a 'user friendly' booklet form, which included a comprehensive patient explanation, consent form and assessment of the need for an interpreter (never needed).

Validation studies

Volunteers for the reproducibility, reliability and internal validation studies were recruited either from the domestic staff (ie cleaners, orderlies) of a local hospital or through acquaintances of 28 previously unemployed local residents on work-based training courses at the local Polytechnic. Questions were asked by a trained interviewer using the first language of the subject. Subjects were asked not to read anything about diabetes until after the second visit which was at least 3 months after the first visit. Volunteers for the external validation of the dietary questions were recruited from the workforces of two local manufacturing companies. Volunteers were randomly assigned to receive either a dietary assessment or the DKB questionnaire first. The dietetic assessments were made by a registered dietitian using the method of Burke and Stuart[14].

Statistics

Analyses were carried out using SPSS-PC (SPSS Inc, Chicago, II, USA). Internal consistency was assessed using Cronbach's alpha and stability by Pearson correlations. Comparison of categorical variables was by χ^2, and normally distributed continuous variables by analysis of variance. Non-normally distributed variables (eg knowledge scores) were compared by Mann–Whitney test (unpaired) or Wilcoxon's test (paired). For allocation of calorific value to the items in the short food frequency questions, standard portions were assumed according to New Zealand Dietetic Association guidelines[15]. Internal validity for the subjects' responses was assessed by comparing scores from those with and without diabetes or a family history of diabetes. The hypothesis tested was that the former would know more about diabetes.

Results

Subjects

Characteristics of the 350 subjects involved in the reliability studies are shown in Table 1. Overall, 69% agreed to complete a repeat questionnaire. The proportion agreeing to repeat the questionnaire was lowest among Maori and Pacific Islands subjects. Within each ethnic group, subjects repeating and not repeating the questionnaire were similar with regards to sex, age, educational level achieved, family history of diabetes and language at home. Only 0.9% of subjects ate no meat, 2.7% ate no bread and 5.2% no potatoes.

Reliability and validity of knowledge questions

Table 2 shows the characteristics of the closed and open knowledge questions. Good reliability and stability are demonstrated. Reproducibility of both the open and closed questions was acceptable, although the repeat score was always significantly higher than the initial score. This was particularly the case for the open questions among Pacific Islands subjects. While Maori and Europeans had similar closed scores, Maori had lower open scores. The scores for the seven stems in the closed questions correlated significantly (P<0.001) with the total scores in each ethnic group (Pearson's r: European 0.46–0.83; Maori 0.53–0.84; Pacific Is 0.57–0.80). Similarly, the score for each of the four open questions correlated significantly (P<0.001) with the total open score (Pearson's r: European 0.68–0.83; Maori

Table 1. Characteristics of subjects in reliability/reproducibility and dietary external validation studies.

	Reliability/reproducibility studies				*Dietary studies*
	European	Maori	Pacific Is	Comparison across ethnic groups: *P*<	
Number seen: seen twice/seen once (%)[a]					
	91/112(81%)	39/77(51%)	112/161(70%)	0.001	47[b]
Age	41 ± 17	35 ± 14	36 ± 13	0.01	36 ± 10
% male	40%	34%	22%	0.01	28%
Only English Spoken at home	100%	79%	24%	0.001	81%[c]
Education					
Secondary or less	50%	64%	76%	0.001	72%
Form 6 and above	50%	36%	24%		28%
% Family history of diabetes	25%	30%	24%	ns	40%
% diabetes	30%	27%	17%	0.05	42%

[a] Relates to number of subjects seen on two occasions and those only seen on one occasion.
[b] 15 Europeans, 26 Maori, 6 Pacific Islands.
[c] Maori and Pacific Islands subjects only.

Table 2. Test characteristics of diabetes knowledge questions.

	European (*n*=112)	Maori (*n*=77)	Pacific Is (*n*=161)	All (*n*=350)
Reliability (Cronbach's α)				
Open (*n*=4 questions)	0.74	0.59	0.66	0.73
Closed (*n*= 31 questions)	0.87	0.90	0.90	0.89
Both (*n*= 35 questions)	0.89	0.88	0.90	0.89
External validity (Pearson's r)				
Open vs closed score (Totals)	0.56	0.28	0.42	0.42
sig:	*P*<0.001	*P*<0.05	*P*<0.001	*P*<0.001
Reproducibility (Pearsons r)	*(n=91)*	*(n=39)*	*(n=112)*	*(n=242)*
Open scores	0.74	0.39	0.56	0.68
sig:	*P*<0.001	*P*<0.01	*P*<0.001	*P*<0.001
Closed scores	0.69	0.38	0.39	0.50
sig:	*P*<0.001	*P*<0.05	*P*<0.001	*P*<0.001
Reproducibility (Median (range))				
Open scores: initial	33%(0–100%)	20%(0–73%)	7%(0–87%)	20%(0–100%)
repeat	40%(0–87%)	27%(0–80%)	20%(0–93%)	27%(0–93%)
Closed scores: initial	55%(0–90%)	58%(0–94%)	48%(0–97%)	52%(0–97%)
repeat	65%(0–97%)	68%(0–100%)	55%(0–97%)	61%(0–100%)
Scores by diabetes (self or family) (1-tailed)				
Open scores: no diabetes	27%(0–80%)	13%(0–67%)	0%(0–80%)	
diabetes	37%(0–100%)	20%(0–73%)	13%(0–87%)	
sig:	*P*<0.05	*p=0.07*	*P*<0.001	
Closed scores: no diabetes	45%(0–90%)	39%(0–90%)	48%(0–94%)	
diabetes	58%(0–90%)	65%(0–94%)	58%(0–97%)	
sig:	*P*<0.02	*P*<0.02	*P*<0.03	

0.54–0.81; Pacific Is 0.67–0.76).

Table 2 shows that the open and closed scores were generally able to detect this. Neither open nor closed knowledge measure was correlated withage within any ethnic group. Among Europeans, those with education above form 6 had a higher 'knowledge index' than those with less education (29% vs 43%, $P<0.01$).

Using the Likkert scale question, diabetes was seen as 'very damaging and can kill you' (the highest score) by the great majority of people (European, Maori, Pacific Is respectively: initial 79%, 83%, 68%; repeat – 90%, 90%, 70%). As very few subjects had lower scores, Pearson's correlations could not be calculated. However, there was no significant difference in score between initial and repeat testing. Among Pacific Islands people, those with diabetes or a family history of diabetes had a significantly higher score than the others ($P<0.02$).

Reliability and validation of a 'fat index'

Table 3 shows that within each of the seven items, the 'fat index' was ranked highest in the 'high-fat' group and lowest in the 'low-fat' group. This correlation held true both overall and within each ethnic group. Reliability and reproducibility of the questions were acceptable both overall and within ethnic group as shown in Table 5. Over 90% of subjects from all ethnic groups ate a high-fat spread. The item relating to this was least reliable with an increased Cronbach's α on its removal (increasing overall to 0.62, Europeans to 0.54, Maori to 0.63, Pacific Islands to 0.63). The external validation of the 'fat index' (Table 4) demonstrated a signficant correlation with the total fat consumed overall and within ethnic group.

The 12-item food frequency questionnaire

The reliability of the four-item HFHRC score was acceptable as shown in Table 4. The reproducibility studies and external validation for the HFHRC score and food frequency calories were acceptable (Table 4). The fruit frequency question was reproducible (Table 4). Among Europeans in the external validation study, the fruit frequency question correlated negatively with the total fat consumed ($r=-0.66$, $P<0.01$) and total protein consumed ($r=-0.62$, $P<0.05$). A variable degree of internal validation for the 'fat index' and three food frequency scores was provided through correlations with each other (Table 4). The fat index and food frequency calories were negatively correlated with age among Maori ($r=-0.23,-0.27$ respectively, $P<0.05$) and Pacific Islands subjects ($r=-0.24$, $P<0.01$, -0.29, $P<0.001$ respectively) but not Europeans. The fat index and HFHRC were not correlated. Dietary measures did not differ significantly with educational level achieved or with diabetes status.

Results for other questions

Regular alcohol consumption was reported in minority of subjects (43% Europeans, 32% Maori, 19% Pacific Islands), ie median alcohol consumption was 0 units. The reported number of units consumed correlated on the first and second occasions ($r=0.70$) and between dietitian and questionnaire ($r=0.88$). Television was watched regularly by 48% Europeans, 57% Maori and 62% Pacific Islands subjects. Reproducibility of the number of hours of reported watching was good (Overall $r=0.43$, $P<0.001$; Europeans 0.48 $P<0.001$, Maori 0.71, $P<0.05$, Pacific Islands 0.26, $P<0.01$).

Discussion

The primary prevention of type 2 (non-insulin-dependent) diabetes is now being considered and attempted through a variety of changes in lifestyle (particularly through diet and exercise)[16, 17]. While similar studies for the prevention of heart disease in populations have been assessed[18–20], none have yet been reported for type 2 diabetes. While the success of such population strategies is ultimately shown in reduced incidence of the disease and mortality, during the early stages it is necessary to develop the prevention package and tailor it to each population. The DKB questionnaire is a tool for evaluating community-based diabetes control programmes within very different population groups. With the numbers involved, the need is not for quantitative accuracy but rather for an ability to demonstrate rapidly that, when compared with a control group, an intervention group has increased

Table 3. Qualitative indicators of fat consumption: the 'fat index'.

	High-fat (2)	Medium-fat (1)	Low-fat (0)	
How do you usually use/cook:				
Milk[a]		Dark blue/silver	Light blue	Green/trim
Eggs		Fried/scrambled		Poach/microwave/boil
Chops	}	Fry/pan roast		Boil/grill/microwave
Chicken	}			Roast on rack
Do you:				
Cut the fat off meat		Never/sometimes	Usually	Always
Cut the skin off chicken		Never/sometimes	Usually	Always
When you eat bread, what spread do you usually use		Dripping/butter /margarine	low fat margarine	None

The numbers in brackets indicate the score for each item.
If two or more options are chosen, that containing the highest fat is coded.
The 'fat index'=Σ(7 scores)/(No. of items $\times$ 2).
If the item is not eaten (not the spread question), that item is omitted from the denominator.
[a] Colour signifies fat content of standard milk varieties marketed in New Zealand.

Table 4. Test characteristics of dietary questions

	European	Maori	Pacific Is	All
Reliability (Cronbach's α): *n*	112	77	161	350
Fat index (7 items)	0.51	0.53	0.51	0.53
High-fat/high-refined carbohydrate (HFHRC)	0.53	0.67	0.74	0.66
Internal validity (Pearson's *r*)				
Food frequency vs HFHRC	0.55***	0.38**	0.44***	0.41***
Food frequency vs fat index	0.23*	0.26*	0.05	0.18***
Fat index vs fruit frequency	–0.25*	–0.33**	–0.07	–0.18***
Reproducibility (Pearson's *r*)	(n=91)	(n=39)	(n=112)	(n=242)
Fat index	0.61***	0.70***	0.44***	0.56***
Food frequency	0.49***	0.45**	0.52***	0.51***
HFHRC	0.64***	0.37*	0.56***	0.54***
Fruit frequency	0.54***	0.41*	0.21*	0.35***
Reproducibility (median (range)				
Fat index (%) 1	58(8–100)	75(8–100)	67(8–100)	60(8–100)
Fat index (%) 2	58(0–100)	75(8–100)	58(0–100)	58(0–100)
Food frequency calories 1	4776	5468	5764	5308
(calories/week)	1682–18886	1450–19686	1146–17674	1146–19686
Food frequency calories 2	4141*	5633	6092	5092
(calories/week)	1656–14093	996–13540	236–24954	236–24954
HFHRC (d/week) 1	1.8(0.0–5.0)	1.5(0.0–4.5)	1.3(0.0–6.0)	1.5(0.0–6.0)
HFHRC (d/week) 2	1.8(0.0–6.0)	1.5(0.0–4.0)	1.5(0.0–6.5)	1.5(0.0–6.5)
Fruit frequency (d/week) 1	6(0–7)	6(0–7)	6(0–7)	6(0–7)
Fruit frequency (d/week) 2	6(0–7)	6(0–7)	6(0–7)	6(0–7)
External validation vs Dietetic assessments (Pearsons *r*) *n*	15	26	6	47
Total fat vs				
Fat index	0.53*	0.59**	0.90*	0.62***
Food frequency calories	0.41	0.62***	0.65	0.58***
HFHRC	0.64*	0.44*	0.71	0.53***
Total calories vs				
Fat index	0.40	0.55**	0.88*	0.54***
Food frequency calories	0.52*	0.64***	0.48	0.56***
HFHRC	0.73**	0.39*	0.72	0.52***

2-tailed results: * $P<0.05$; ** $P<0.01$; *** $P<0.001$

their diabetes knowledge, reduced their weight, fat and total calorie intake, all without a relative reduction in 'happiness'. The current evaluation demonstrates that the DKB questionnaire is a valid and reliable tool to assess these attributes in the three major ethnic groups in Auckland.

The problems with questionnaire for assessing knowledge and lifestyle are well known. Open diabetes knowledge questions can reflect verbal ability and recall memory, while expected responses to multiple choice and true/false questions can be 'guessed'. Questionnaires that are posted can be answered following consultation with other sources of information (eg other family members/literature). Testing repeatability for such questionnaires is particularly difficult as subjects will either actively or passively increase their knowledge by the time of the next test. In the present study, the increase was by 7–13% for both open and closed questions. Similar studies have not reported reproducibility[8–12]. In spite of these problems, the two components used in the DKB

questionnaire were valid, reliable and reproducible. The questionnaire is one of the first diabetes knowledge questionnaires applicable to predominantly non-diabetic subjects[7, 21]. It was precise enough to detect differences in knowledge between those with and without a history of diabetes. There was an expected difference in score among those with more education, but only among Europeans. Whether this reflects more knowledge or more expertise is difficult to predict.

Problems with dietary questionnaires are even more pronounced. There is still no gold standard for assessing individual dietary intake[22, 23]. Intake can vary greatly and can be under-reported by at least 50%[22, 23]. In view of this, the comparison with the traditional method of Burke and Stewart used here[14] was considered to be adequate as an external validation for the three 'indices' (fat index, food frequency calories and HFHRC). The overall result was better than expected with significant correlations overall and also within each of the three ethnic groups. The fat index in particular was signficantly correlated with both total and fat calories among the small group of Pacific Islands subjects. Subjects in the external validation (manual workers at local manufacturing companies) were similar in terms of education with Maori and Pacific Islands subjects in the reproducibility, reliability and internal validation studies. In Europeans, while the reproducibility, reliability and validity (internal and external) has been shown in those educated to secondary education or less, a low proportion of subjects in the external validity study were educated to form 6 or above. However, no difference in the other evaluation results were found with educational level and hence it is unlikely that the questionnaire is any less valid in those educated to a higher level.

The fat index correlated only weakly with the food frequency calories, not at all among Pacific Islands subjects, and not at all with the HFHRC. As these relationships were weak in all ethnic groups, it is likely that the low correlation coefficients were due to differences in what the measures were actually quantifying rather than due to cultural differences in the validity of the tool. An increase in fruit (and vegetable) consumption associated with a reduction in fat consumption remains one of the recommendations for 'healthy eating'. The fruit frequency correlated negatively with the fat index in Europeans and Maori but not in Pacific Islands subjects. This is possibly due to cultural differences in eating practices relating to fruit.

The reproducibility of all the scores was acceptable[24], although Europeans had a lower food frequency calorie score on the re-test. This is difficult to explain but could be due to changes with time. The alcohol score and TV watching question had high reproducibility. However, these are not to be the targets of direct public health messages. The former may change with alterations in health awareness, while the latter may decline with increased exercise.

A fat score was recently validated in Newcastle, Australia[25]. This assessed type of spread and milk consumed and applied categorical values to semi-quantitative data such as the amounts consumed of milk, eggs, fat left on meat, ice cream, cheese and chocolate. The New York State Healthy Heart Programme has also developed a 13-item fat intake screening tool[26] and a 17-item nutrition screen[27] for use in a population with white, black and Hispanic subjects. The main contributors (52%–72% of total) to cholesterol/saturated fat were eggs, whole milk, cheese, beef and butter/margarine and it was suggested that these five items be the focus of public health campaigns[26].

While the sampling of this study does not allow ethnic group comparisons, it is interesting to note that although the fat index was similar between Europeans and Pacific Islands people (and high in Maori), the food frequency calories were highest in Pacific Islands people. Although major Pacific Islands staples and coconut cream were omitted from the food frequency calorie score, the 12 items used seem to adequately reflect the large quantities of food consumed by Pacific Islands people. The high fat intake of the Maori has also previously been reported[28] and provides another external validation of the questionnaire.

In conclusion, the DKB questionnaire is a valid and reliable tool for evaluating diabetes control programmesa in a multi-ethnic community setting. Its usefulness now needs to be tested in specific studies.

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Appendix 1 Closed diabetes knowledge questions

1 Which of these is/are true?

A person with diabetes will have it for the rest of his/her life*.
The body of a person with diabetes can handle sugar properly.
Diabetes can be controlled*.
A person with diabetes has too much sugar in the blood*.
A person with diabetes can be harmed if the diabetes is not controlled*.

2 Which of these are symptoms of uncontrolled diabetes?

Feeling very thirsty*.
Having lots of energy.
Needing to go to the toilet a lot*.
Putting on weight.

3 Which of these can be damaged in uncontrolled diabetes?

Eyes*.
Ears.
Lungs.
Heart*.
Kidney*.
Feet*.

4 Which of these foods have a lot of sugar in them?

Fruit juice*.
Chocolate bars*.
Potatoes.
Artifical sweetners (eg equal, sucaryl).

5 Which of these foods have a lot of fat in them?

Butter*.
Brown bread.
Margarine*.
Takeaways*.

6 Which of these put you at risk of getting diabetes?

Being overweight*.
Being European.
Not doing exercise*.
Having someone in your family with diabetes*.

7 Which of these things can help you avoid diabetes?

Losing weight*.
Drinking alcohol.
Eating fried food.
Doing regular exercise*.

* correct answer.

Evaluation of a diabetes knowledge and behaviour (DKB) questionnaire

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糖尿病知識和行爲問卷（DKB）的評估

摘要

目前認爲可能通過生活方式的轉變對Ⅱ型（非胰島素依賴型）糖尿病進行初級預防。目前已建立對人群預防糖尿病的策略。新西蘭南奧克蘭市（South Auckland）糖尿病科研項目已研製了一份問卷來評估當地社會的糖尿病覺察、運動／健康飲食計劃的效果。這份問卷已用來評估當地成人包括歐洲（n=127）、毛利（n=103）和太平洋島成人（n=167）。問卷用以直接探詢並約需 30 分鐘。糖尿病知識用 4 個開卷問題和 31 個閉卷正／負題來評估，這些問題在所有種族中都獲得良好的可靠性（Cronbachs α范圍 0.59—0.90）、重複性（Persons r 范圍 0.39—0.74）和客觀的確實性（r 范圍0.28—0.56）。再測試時中數增加 7—13%。在那些患有糖尿病或有糖尿病家族史的人中，開卷和閉卷問題分數分別高出 7—13% 和10—26%。作者用四種方法來評估重要的飲食習慣：（1）七項食物製備／脂肪含量「脂肪指數」。（2）四項高脂／高精碳水化合物，當與膳食評估相比較（總脂肪 r：0.44—0.90）、有良好可靠性（Cronbachs α范圍 0.51—0.74）、重複性（r：0.37—0.70）和客觀的確實性。（3）12 項食物頻率問卷亦具有良好重複性（Pearsons r 0.45—0.52）、並與總熱量（r：0.48—0.64）和脂肪熱量（r：0.41—0.65）的膳食評估有良好相關。（4）一個簡單的與水果進食頻率有關的問題與歐洲人（r=-0.25，p<0.05）和毛利人（r=-0.33，p<0.01）的脂肪指數呈負相關。該問卷並未對營養習慣進行定量評估，但它卻提供了一個迅速的方法，去評價和指導Ⅱ型（非胰島素依賴型）糖尿病的控制和預防。