One-to-one teaching with pictures — flashcard health education for British Asians with diabetes

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SUMMARY

Background. *Type 2 diabetes is up to four times more common in British Asians, but they know little about its management and complications.*

Aim. *To design and evaluate a structured pictorial teaching programme for Pakistani Moslem patients in Manchester with type 2 diabetes.*

Method. *A randomized controlled trial of pictorial flashcard one-to-one education in 201 patients attending a hospital outpatient clinic or diabetic clinics in ten general practices in Manchester. Patients' knowledge, self-caring skills and attitudes to diabetes were measured on four topics before the structured teaching, and compared with results six months later.*

Results. *All parameters of knowledge were increased in the study group; for example, percentage scores for correctly identifying different food values increased from 57% to 71% (Analysis of Variance (ANOVA) adjusted difference +11.8%) and knowledge of one diabetic complication from 18% to 78%. Self-caring behaviour improved, with 92% of patients doing regular glucose tests at six months compared with 63% at the start. Attitudinal views were more resistant to change, with patients still finding it hard to choose suitable foods at social occasions. Haemoglobin A1c control improved by 0.34% over six months (ANOVA adjusted difference, 95% CI –0.8% to +0.1%).*

Conclusion. *It is concluded that this health education programme can empower Asian diabetics to take control of their diets, learn to monitor and interpret glucose results, and understand the implications of poor glycaemic control for diabetic complications.*

Keywords: Asians; type 2 diabetes; health education.

Introduction

THE prevalence of type 2 diabetes is up to four times higher among Asian immigrants to Britain than among the indigenous white community,[1,2] and Asians seem to be more susceptible to the associated renal and cardiac complications.[3] (The term 'Asian' is used here as an 'umbrella' term for people originating from the Indian subcontinent, regardless of their place of birth.) As the current British Asian population is still predominantly young (over 60% are under 30 years old), we can expect the prevalence of diabetes and its complications to increase with time.[4] It is worrying that some previous studies have shown British Asian patients to have a poorer knowledge of diabetes than their white peers,[5,6] as a good understanding of diabetes is vital to maintaining good glycaemic control and reducing the risk of complications.[7-10]

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Pictures can help understanding and improve recall in health education.[11] They have been used extensively in the advertising industry, but little is known of their effectiveness in health education. This study aimed to develop a set of culturally appropriate pictorial flashcards for the education of Manchester Pakistanis with diabetes, and to evaluate the effectiveness of the cards when combined with an individual tuition package.

Study design and methods

This was a randomized, controlled trial of one-to-one flashcard tuition, followed by an outcome evaluation at six months. Outcome measures were based on knowledge scores, changes in self-caring behaviours and attitudes to the condition, and changes in serum cholesterol and haemoglobin A1c (HbA1c). Attitudinal issues were measured by asking about feelings on diet, attending clinics, beliefs in traditional food values and food choices in hypothetical situations, such as at a wedding. The four educational topics used here were selected from the results of an earlier survey and focus group discussions with Pakistani Moslems from Nottingham diabetic clinics.[5] This survey showed that patients are most likely to want health education on diet, but in fact know little about glucose monitoring, how to control blood sugar, diabetic complications, and the purpose of regular screening to pick up and treat early complications.

Development of the flashcards and education technique

Pictures are most effective when their contents are familiar, realistic and depict a single activity.[12] Ten colour photographs were produced with the help of a dietitian, linkworker and professional photographer, enlarged to A3 size and laminated. They used Asian models, utensils and foods. Each was designed to cover one or more predetermined teaching objectives. A standardized interview questionnaire was developed to use with the flashcards, and face validation of both was systematically obtained from staff and patients at diabetes clinics in Nottingham and Manchester. Interviews were carried out by a linkworker fluent in Urdu, Punjabi and English. She had no medical background but received informal in-house training at the Manchester Diabetes Centre and was taught to conduct a structured education package. Questionnaires were translated during the interview, tailored to individuals' understanding. Interviews were videotaped and shadow-marked by other Urdu-speaking staff members to ensure standardization and reliability. A pilot study to test the method on 19 consecutive patients attending a diabetic clinic, enabled refinement of the questionnaire and interview technique. Consensus validity for the questionnaire was sought by comparing pilot study results with a study two years earlier that had used the same questionnaire, and a similar patient knowledge pattern was obtained.

It was calculated that a sample size of 100 control subjects and 100 patients receiving the educational intervention would be needed to show a difference of 1% in HbA1c over the six-month study period (power = 0.8 at $P = 0.05$ level).[13] Ethical approval for the study was obtained from the Central Manchester Hospitals Trust.

Methods

Pakistani patients with type 2 diabetes attending the Manchester

Diabetes Centre and ten neighbouring general practices were entered into the study between August 1992 and November 1993. They were excluded if they were enrolled in any other study, if they or a spouse had received formal diabetes education in the preceding six months, if they were planning to go abroad during the study period, or if they were thought by the clinic doctor to be too ill to take part. After giving informed consent, patients were allocated to control or intervention groups as they presented at clinics, using presealed envelopes and random number tables. Interviews took place in the hospital clinic, general practitioners' surgeries or at the participant's home, in the language they felt most comfortable using.

All patients answered a baseline questionnaire to assess their starting levels of knowledge and self-caring skills, and had blood taken for HbA1c and serum cholesterol tests. The intervention group were shown the flashcards by the linkworker, together with the structured education package. They were taught to check their urine for sugar, if they did not already do it. At six months, both control subjects and intervention patients were retested and the blood samples were repeated.

Non-attenders were followed up by telephone and home visits. All blood samples were tested at the Manchester Royal Infirmary to ensure standardization. HbA1c was measured by the Bio-Rad Diamat (HPLC) method.

Statistical methods

The SPSS PC+ package was used to analyse the data. At six months, the intervention group was compared both with itself at the start and with the control group, using chi square tests for non-parametric data. Some parametric data were analysed using analysis of variance (ANOVA adjusted differences) to allow for the problem of regression to the mean for repeated measurements in the same subjects (HbA1c, cholesterol and questionnaire scores).

Results

Two hundred and one people entered the study: 94 men and 107 women. One hundred and thirteen were allocated to the intervention group and 89 to the control group. A total of 192 people returned for follow-up. Two patients had died from ischaemic heart disease and tuberculosis, four went home to the Indian subcontinent and four could not be traced. Five people refused to take part, mostly saying either that they were too busy or that they already knew about diabetes.

Only five patients spoke English from preference, one third had no understanding of English and 70 (35%) had had no formal education. Overall, 137 (68%) were on oral hypoglycaemic agents and 147 (73%) were under GP/hospital shared care. Two thirds checked their urine or blood for sugar and 17 (8%) kept records. Despite the large number who monitored their sugar levels, only half understood the purpose of monitoring, and only a quarter knew what to do if sugar levels were persistently high. Just over half (53%) had more than one diabetic complication. Their mean HbA1c level was 8.5% (95% CI 8.2–8.8%), with 153 (80%) having levels above the normal range (provisional reference range for this laboratory <7%). Mean cholesterol levels were 5.9 $mmol^{-1}$ (95%CI 5.69–6.12) with 34% having levels above 6.5 $mmol^{-1}$.

A comparison of cases and control subjects at the beginning of the study showed them to be similar (Table 1).

Within-group comparisons

The effect of flashcard education on the intervention group is shown in Table 2. All outcomes measuring knowledge improved; for example, patients increased their individual food value scores (expressed as percentage correct) from 71% to 84% (ANOVA adjusted difference in knowledge scores +7.8%, 95%CI +4.9 to +10.7). At six months, 78% of the study group could name one complication of diabetes compared with 18% at the start of the study and 16% of the control group. Knowing the purpose of screening improved from 44% to 92% ($\chi^2 = 42.2$, df = 1,

Table 1. Comparison of demographic and outcome measures at entry to the study.

	Study group n = 112 (%)	Control group n = 89 (%)
Demography		
Sex (male:female)	52:60	42:47
Age	52[a] (50–54[b])	54[a] (51–58[b])
No formal education	47 (37%)	29 (33%)
HbA1c	8.4%[a] (8.0–8.9[b])	8.6%[a] (8.1–9.0[b])
Knowledge		
Agree importance of diet	84 (74%)	67 (75%)
Food group value scores	57%[c] (54.6–59.4[b])	58%[c] (54.9–61.1[b])
Individual food value scores	71%[c] (69.1–72.9[b])	73%[c] (70.9–75.1[b])
Can manage hyperglycaemia	27 (24%)	22 (25%)
Knows diabetic complications	20 (18%)	13 (15%)
Attitudes and behaviour		
Hard to refuse food	82 (73%)	61 (69%)
Can choose correct food at wedding	64%[c] (60.5–67.5[b])	63%[c] (59.7–66.3[b])
Check glucose	72 (63%)	61 (69%)
Keep records	8 (7%)	9 (10%)

[a]mean; [b]95% CI; [c]mean correct. All differences not statistically significant.

Table 2. Effect of flashcard education after six months compared with controls subjects.

	Study group n = 106 (%)	Control group n = 86 (%)
Knowledge		
Agree importance of diet	100 (94%)	71 (81%)
Food group value scores	71%[a] (69–73.2[b])	59.5%[a] (56.1–62.9[b])
Individual food value scores	84%[a] (81.9–86.1[b])	76.2%[a] (74.2–78.2[b])
Knows reasons for monitoring	98 (92%)	28 (33%)
Can manage hyperglycaemia	93 (88%)	32 (37%)
Knows diabetic complications	83 (78%)	14 (16%)
Knows about chiropodist	49 (46%)	17 (20%)
Attitudes and behaviour		
Hard to refuse food	88 (83%)	63 (74%)
Can choose correct food at wedding	78%[a] (74.2–81.2[b])	61.1%[a] (57.5–64.7[b])
Check glucose	97 (92%)	60 (69%)
Check > once a week	63 (59%)	30 (33%)
Keep records	41 (39%)	3 (3%)
Glycaemic control		
Mean HbA1c% (95% CI)	8.3% (7.86–8.74)	8.64% (8.22–9.06)

[a]mean correct; [b]95% CI.

$P<0.001$), and knowledge of the role of the chiropodist improved from 11% to 46% ($\chi^2 = 21.8$, df = 1, $P<0.001$). Self-caring behaviour increased; for example, glucose monitoring rose from 63% to 92%, and the number of people checking more than once a week doubled from 26% to 59%. Knowing what to do if glycaemic results were consistently high also improved significantly.

Some attitudinal outcomes did not improve; for example, patients seemed to find it harder to refuse food at social events (from 72% to 83% at six months). When patients were asked about clinic availability, most said they would like to come at least once a month and see a doctor each time. The control group gave the same response and were unchanged.

Glycaemic control improved; ANOVA adjusted difference for HbA1c within the study group was –0.34% (95% CI –0.81 to +0.13), but there was no change in cholesterol over this period (ANOVA adjusted difference 0.04 $mmol^{-1}$, 95% CI –0.2 to +0.27).

Between-group comparisons

The control group remained essentially the same over the six-month study period, with the exception of knowledge of foot complications (10% knew of the chiropodist at entry to the study, rising to 26%). At six months, many outcome measures differed significantly between intervention and control groups, with the former showing improvements in knowledge scores, increased self-caring behaviours and some changes in attitudes to diabetes and the diabetes service. There had been no difference in the medical treatment of the groups during this time. Nine patients in the intervention group and 20 in the control group had received further health education from other sources. Despite this difference, there were still major differences in knowledge and behaviour between the two groups.

Qualitative assessments

Most patients were positive about the education they had received. This was partly because of the linkworker's sensitive approach, but patients also said they valued the information received and felt empowered by it to take control of their diabetes. Few people suggested improvements to the teaching method — two patients wanted videotapes or audiotapes. A flashcard showing pictures of foods one could eat with diabetes and another showing the sites of diabetic complications were the most popular. Some wanted to keep the dietary flashcards so that they could refer to them when shopping.

Discussion

This study has shown that pictorial flashcard education combined with a one-to-one teaching programme can improve knowledge about diabetes, increase self-caring behaviour and affect some aspects of attitudes to diabetes and the diabetes clinic. Although knowledge scores in the intervention group rose for both groups of foods (such as 'vegetables' or 'red meat') as well as individual foods, they tended to be higher for the latter, implying that patients found it easier to think in those terms rather than in food categories. This may be useful in designing future dietary health education.

There were few changes in the control group over the six-month study period. The improvement in knowledge about diabetic foot complications in this group resulted from patients discussing their foot problems with the linkworker who then referred them to the diabetes foot nurse. There were slight improvements in glycaemic control. At best, the intervention may have improved HbA1c levels by 0.8%, which is important clinically; at worst, it increased them by 0.1%, an insignificant difference. Six months may not be a long enough time to measure continued changes in metabolic control. In addition, from their medical records and previous HbA1c levels, many patients appeared to be undertreated with hypoglycaemics, while on a relatively good diet, according to their food diaries.

Low literacy levels and inexperience of formal education did not stop patients from learning about diabetes and how to control it. Health education in this context cannot be divided into its separate constituents of flashcards, one-to-one interviews and reinforcement, as all of these are important in health education theory in producing a change in behaviour and attitude. Certainly, the flashcards on their own would be of little value, but in this important group, with low literacy levels, they were a useful adjunct, and patients commented on them favourably. It might be possible to use them as 'stand-alone' pictures after a structured teaching session, perhaps as calendar pictures or posters to be hung in the kitchen. The flashcards themselves are easily reproducible and inexpensive. Teaching sets could be made for suitable practices and hospital diabetic clinics.

Many patients told us they did not want others to know they were diabetic and therefore were unable to dictate their food choices publicly. Perceived difficulty in refusing food at such times continued to be high throughout the study, and it is clear that social factors outweigh considerations of health in some situations. Patients, families and their communities would need repeated efforts to overcome the social stigma of illness. Patients' desire to see a doctor frequently showed considerable anxiety and concern for health.

This study describes the ideal situation — someone with time, information and language skills giving one-to-one education. Is this feasible in real life? The linkworker spent 20 minutes with each patient on the education itself (covering four topics). She worked alongside specialist nurses and doctors in the hospital clinic, and practice nurses and GPs in the community. She was employed on a part-time basis and did four to six clinics a week, spread across primary and secondary care. If such a non-medical person can be shared in this way, the method is effective. Diabetes is a chronic condition, and patients are seen over and over again. If a checklist of important educational objectives is established for individual patients, the linkworker can systematically cover them over a series of contacts, refreshing earlier sessions where needed. Consequently, this study has shown that a motivated member of the community can be trained to deliver standardized health education in a health care setting.

Pictures were well received by this group, who often asked if they could keep them. Educational levels should be taken into account when designing health education programmes so that the recipients find them both culturally acceptable and appropriate to their literary skills. In addition, we found our patients preferred one-to-one opportunistic health education at clinics rather than organized group sessions, even if these were single sex. Once such a contract had been started, patients' compliance with further sessions was excellent. As the British Asian community is diverse, these factors may be less important in communities where literacy levels are higher or people are more westernized.

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