S Pardhan¹ and I Mahomed²

Knowledge, self-help and socioeconomic factors in South Asian and Caucasian diabetic patients

Abstract

Aims We carried out a survey of important nonclinical issues including awareness and self-management of diabetes on a group of South Asian and Caucasian patients attending diabetic clinics within a set period. *Methods* A structured questionnaire examined various issues including demographics, perceived knowledge and awareness of diabetes, perceived self-help/ support, and psycho-social factors. A total of 500 patients (268 South Asians and 232 Caucasian) took part.

Results Univariate analysis showed significant differences (P<0.05) with various issues including a lower perceived awareness of diabetes and its complications in South Asians, and of the nutritional content of their diet. Asians also appeared to be less worried in the event of missed clinical appointments and if treatment was not strictly adhered to. Conclusions The study provides evidence of the inability of health information systems to convey the importance of diabetic control to the Asian population. In order that this important information reaches the required recipients, more assertive and perhaps more culturally acceptable methods need to be explored.

Eye (2004) 18, 509-513. doi:10.1038/sj.eye.6700680

Keywords: Asian; diabetes; self-help; awareness; socio-economic

Introduction

Roughly 2–4% of the UK adult population suffer from diabetes and about 5% of total health-care expenditure is spent on the care of these patients.¹ Studies in various parts of the world^{2–5} including the UK^{6–10} report a higher prevalence of diabetes in Asians from the Indian subcontinent than in other races. The order of increase in prevalence of diabetes in Asians could be as high as four times that of people of European (Caucasian) origin.⁷ Greenhalgh¹¹ suggests various hypotheses to explain the high prevalence rates of diabetes in South Asians. Although these factors, embracing nature and nurture, are not mutually exclusive, they probably interact with each other in a complicated and undetermined manner. It is known that adequate control of diabetes is essential if complications are to be reduced.¹² If patients are to contribute to the effective control of their diabetes, their knowledge, self-caring skills, self-control, and attitude to diabetes are important.

At present, very little is known about Asian patients' attitudes towards self-help and importance of control of diabetes, although some evidence of lower uptake of health service provision by ethnic minorities in the UK has been shown^{13,14} in diabetic clinics,¹⁴ for coronary artery diseases,¹⁵ referral rates and attendance in Emergency Departments.¹⁶ Awareness of the existence and utilisation of community health and social services is also low among Asians.17,18 In diabetic patients, Hawthorne¹⁹⁻²¹ reported poorer blood glucose control and lower awareness of diabetes management in a group of Pakistani Moslems. Although a few studies, including those by Hawthorne²² and Simmons et al,²³ examined knowledge of diabetes in Asians and Caucasians, comprehensive comparative data on various other issues including anxiety if hospital appointments were missed and awareness of their diet do not exist. We aim to examine these in addition to the patients' perceived levels of knowledge of diabetes,

¹Department of Optometry and Ophthalmic Dispensing Anglia Polytechnic University Cambridge, UK

²Department of Ophthalmology Bradford Royal Infirmary Bradford, UK

Correspondence: S Pardhan Department of Optometry and Opthalmic Dispensing Anglia Polytechnic University Cambridge CB1 1PT, UK Tel: +44 1223 363271 ext 2257 Fax: +44 1223 417712 E-mail: s.pardhan@ apu.ac.uk

Received: 25 February 2003 Accepted in revised form: 10 June 2003 510

including knowledge prior to diagnosis of diabetes and awareness of the possibility of inheritance, etc.

Materials and methods

Patients

All consecutive diabetic patients who attended the Outpatients Diabetic Clinic at Bradford Royal Infirmary between March 1996 and December 1997 were invited to participate in the study. A total of 500 eligible patients, of whom 232 were Caucasians, all born in the UK, and 268 of South Asian origin, took part. All Asians were born abroad in Pakistan, India, or Bangladesh and had settled in Bradford. Patients were included if they were over 40 years of age, were diagnosed as diabetic and had not been treated for any other eye diseases. The study was approved by the appropriate Ethical Committee and followed the tenets of the Declaration of Helsinki. Informed consent was obtained from the patients after explaining the aims of the study. None of the patients was seen more than once. Clinical details of the two groups of patients are given in Table 1.

Methods

A structured questionnaire was designed using strategies and methodological issues recommended for community-based research within a racial/ethnic minority community.²⁴ The questionnaire was based on discussions held with various clinicians and on focus interviews with South Asian subjects. The questionnaire was validated by means of detailed interviews whereby different questions and ways of questioning were investigated and adopted following patients' responses and feedback. Difficult and potentially ambiguous questions were clarified. The questions were also checked for their 'political correctness'. The issues explored are summarised in Table 2. As it is difficult to equate education levels from foreign grades, it was decided to use the age at which full-time education was completed as a better marker. Data on employment (full-time, part-time, homemaker, student, retired) and marital status (married, separated, divorced, widowed, single) were also obtained. Immediate family with diabetes was clarified as either siblings or parents. Awareness of complications of diabetes required the subjects to name the organs that can be affected by diabetes such as eyes, feet, etc. In some questions, a visual analogue scale was used after careful explanation of its use. Each subject was given trial runs on some sample questions until it was deemed that they could perform the test.

The questionnaire was administered in two main Asian languages, Urdu and Hindi, and in English. All the subjects spoke at least one of these languages. No eligible patient refused to take part in the study.

Results

Univariate analysis results of the survey are shown in Table 2. There were no significant differences in sex or marital status between the two groups. A larger percentage of Caucasians (67%) had smaller household structures, that is, of less than three people in the house, compared to Asians (36%). A significant difference also existed in income levels with 59% of Asians having an income of less than £7999 compared to 43% of Caucasians. In total, 7% of Caucasians had an income of higher than £15000 compared to 3% of Asians. Age at which full-time education was completed was significant as well. A total of 57% of Caucasians were educated to 16 years and beyond compared to 35% of Asians.

As Table 2 shows, Asians reported a significantly lower (P < 0.05) perceived knowledge of diabetes, awareness of diabetic complications, and awareness of the nutritional content of their diet. They also reported lower importance of keeping clinical appointments and less

Table 1	Clinical	and	demographic	details
---------	----------	-----	-------------	---------

	Caucasians (n=232)	Asians (n=268)
Gender	M: 105 (45%), F: 127 (55%)	M: 140 (52%), F: 128 (48%)
Mean age (years)	Median: 61.30	Median: 61.30
	(range: 41–80)	(range: 58–87)
Mean duration (years)	Median: 8.00	Median: 9.73
	(range: 0–35)	(range: 0–29)
Country of birth	UK (46.4%)	India (8.2%), Pakistan (38.4%)
-		Bangladesh (4.6%) Other (2.4%)
Age at diagnosis (years)	Median: 50.81	Median: 50.20
0 0 ,	(range: 23–80 y)	(range: 19–78)
No. diagnosed before age of 30 years	3 subjects	6 subjects
Insulin requiring	134 (51%)	162 (60%)



	Variable	Туре	Units/categories	Measure	Caucasian	Asian	Statistic	Value	df	p-value
Sex Categorical 1 Male 0 Female 10 Female 2 Finde Frequencies 127 128 140 127 128 2.425 2 1 2 1.40 127 2 2.425 2 1 2 0.194 127 2 Marital status Categorical 3 Divorced Frequencies 12 1 12 2 12 4 2 14 2 12 2	Demographic details									
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Sex	Categorical	1: Male	Frequencies	105	140	χ^2	2.425	1	0.1194
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			0: Female		127	128	2			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Marital status	Categorical	3: Divorced	Frequencies	12	12	χ^2	2.889	3	0.408
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			2: Widowed		30	24				
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			1: Married 0: Single		142	181 51				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Income (f)	Categorical	2: >15,000	Frequencies	40 17	10	γ^2	12 56	2	0 0018
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	income (2)	categorical	1: 8000–15000	requencies	83	72	λ	12.00	4	0.0010
$ \begin{array}{c} \mbox{harrows}{listing data} & \frac{12}{12} & 26 \\ \mbox{Frequencies} & 133 & 96 \\ \mbox{(years)} & Categorical & 3: Over 16 \\ 1: 14-16 \\ 0: Under 14 & 35 & 68 \\ \mbox{Har-16} & 32 & 26 \\ \mbox{Frequencies} & 4 & 20 \\ \mbox{Har-16} & 72 & 148 \\ \mbox{Har-16} & 72 & 72 \\ \mbox{Har-16} & 72 &$			0: <7999		100	160				
Education age (years)Categorical 1: 14-16 0: Under 143: Over 16 1: 14-16 0: Under 14Frequencies133 13 1896 8 3 χ^2 2: 5682: 0.0007 2: 148 15696 96 χ^2 2: 49.342: 0.000 2: 0.000Household structureCategory2: more than 5 people 1: between 3 and 5 people 0: less than 3 peopleMissing data321 2: 148 7249.3420.000Azareness of diabetes/complicationsResponse ranging not at all (0) to very mossibility of inheritanceResponse ranging not at all (0) to very sponse ranging not at all (0) to very sponse ranging not at all (0) to very (10) to very <b< td=""><td></td><td></td><td></td><td>Missing data</td><td>32</td><td>26</td><td></td><td></td><td></td><td></td></b<>				Missing data	32	26				
	Education age	Categorical	3: Over 16	Frequencies	133	96	χ^2	25.985	2	0.0007
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	(years)	U	1: 14–16	1	61	83				
	-		0: Under 14		35	68				
Household structureCategory L: bottween 3 and 5 people 0: less than 3 people 0:				Missing data	3	21				
structure 1: between 3 and 5 people 72 148 156 96 0: less than 3 people 156 96 Missing data 4 $\begin{array}{cccccccccccccccccccccccccccccccccccc$	Household	Category	2: more than 5 people	Frequencies	4	20	χ^2	49.34	2	0.000
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	structure		1: between 3 and 5 people		72	148				
Missing data4Auareness of diabetes/complicationsResponse ranging not at possibility of inheritanceMean all (0) to extremely likely (1)SD all (0, 343 b) 0.3430.306Whitney within with the second seco			0: less than 3 people		156	96				
Awareness of diabetes/complicationsPerceived possibility of inheritanceContinuous all (0) to extremely likely (1) standard possibility of inheritanceMean n 0.649 232 Mann- 232 1.4694980.142Perceived diabetesContinuous Response ranging not at all (0) to very not at all (0) to veryMean n 0.602 233 Mann- 231 5.855497 497 0.000Perceived diabetesContinuous Response ranging from not at all (0) to very to at all (0) to verySD 229 0.224 2.238 Mann- -1.107 496 496 0.309Perceived diabetes prior to diaposisCategorical 2 twoSt 2 two229 51 0.224 72 Mann- -1.107 496 496 0.309Awareness of complications: 1 one 1 1 one n 231 267 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 0.0365Perceived diabeticContinuous 2 two 3 2 2 2 2 3 3 0.00365 Awareness of complications: 1 one 1 2 2 2 1 3 3 1 3 3 1 3 3 4 Perceived continuous response ranging from 1 of 1 1 one 1 1 2 2 1 3 3 1 3 3 1 3 3 4 Perceived continuous response ranging from not at all (0) 1 1 1 1 1 1 1 				Missing data		4				
Perceived possibility of inheritance PerceivedContinuous all (0) to extremely likely (1)Mean SD 0.649 0.692 0.692 Mann- Mann- 1.469 1.469 498 0.142 possibility of inheritance of diabetesContinuous all (0) to very diabetesResponse ranging not at all (0) to very spaceMean 0.605 0.476 0.476 Mann- Mann- 5.855 497 0.000 knowledge of diabetesContinuous knowledge of diabetes prior to diapetsResponse ranging from not at all (0) to very knowledgeable (1) n 231 267 268 $Mann-$ -1.107 496 0.309 diabetes prior to diagnosisCategorical 3 : three+Response ranging from to operstileMean 0.229 0.224 213 $Mann-$ 267 -1.107 496 0.309 diabetic complications:Categorical 1 : one 3 : three+ 15 Frequencies 166 158 χ^2 χ^2 11.23 3 3 0.00365 Perceived awareness of not at l(0) to very solutionResponse ranging from mot at all (0) to very 320 268 $Mann-$ 10 7.624 496 0.000 Continuous represeived informationResponse ranging from mot at all (0) to very importance of informationResponse ranging mot at all (0) to very important (1) n 230 268 268 268 1000 Perceived informationContinuous from not at all (0) to very important (1) n 220 2202	Awareness of diabetes/	complications								
possibility of inheritanceall (0) to extremely likely (1)SD0.3430.306WhitneyPerceived knowledgeContinuous all (0) to veryResponse ranging not at all (0) to veryMean0.6050.2380.251Whitneyof diabetesContinuous knowledgeable (1) n 0.2380.2310.806Whitney0.000Perceived knowledge of diabetes prior to diapetes prior to diapetesContinuous knowledgeable (1)Nean0.2030.224Mann- ot at all (0) to very-1.1074960.309Awareness of complications:Categorical 1: one3: three+Frequencies166158 χ^2 11.2330.00365Perceived diabeteContinuous knowledgeable (1) n 23126711.2330.00365Awareness of complications:1: one153800000Perceived diabeticContinuous not at ll (0) to verySD0.2410.255Whitney00.000nutritional content of diet informationResponse ranging from not at all (0) to veryMean0.762200 χ^2 0.16310.686ource of informationContinuous reveived from not at all (0)SD0.2020.227Whitney00.0017importance of informationContinuous from not at all (0)SD0.3060.3660.0050.005Perceived if treatment is in to at all (0)SD <td>Perceived</td> <td>Continuous</td> <td>Response ranging not at</td> <td>Mean</td> <td>0.649</td> <td>0.692</td> <td>Mann–</td> <td>1.469</td> <td>498</td> <td>0.142</td>	Perceived	Continuous	Response ranging not at	Mean	0.649	0.692	Mann–	1.469	498	0.142
inheritance n 232268PerceivedContinuousResponse ranging not at all (0) to very knowledgeable (1)Mean0.6050.476Mann- Mann-5.854970.000PerceivedContinuousResponse ranging from not at all (0) to very knowledgeable (1) n 231268268WhitneyPerceivedContinuousResponse ranging from not at all (0) to very knowledgeable (1) n 2312674960.309Awareness of diagnosisCategorical3: three+ 2: twoFrequencies166158 χ^2 11.2330.00365Awareness of complications: no. of possible content of dietContinuousResponse ranging from not all (0) to very solMean0.7100.539Mann- 7.6247.6244960.000awareness of consplications: no. of possible content of dietContinuousResponse ranging from not all (0) to very aware (1)Mean0.7100.539Mann- 7.6247.6244960.000aware ess of informationContinuousResponse ranging from not all (0) to very aware (1)Mean0.7160.202 χ^2 0.16310.686Source of informationContinuousResponse ranging from not at all (0)SD0.2020.224Wintrey10.00017Perceived informationContinuousResponse ranging from not at all (0)SD0.2020.225Vintrey10.686Perceive	possibility of		all (0) to extremely likely (1)	SD	0.343	0.306	Whitney			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	inheritance			п	232	268				
knowledge of diabetesall (0) to very knowledgeable (1)SD0.238 n0.251 231 231 268Whitney 236Perceived knowledge of diabetes prior to diagnosisContinuous not at all (0) to very not at all (0) to very SDSD0.229 0.229Mann- 0.238-1.107 4964960.309Awareness of diabetesCategorical 2: two3: three+ 2: twoFrequencies166 158 3817211.23 3830.00365Awareness of complications: 0: none1: one15 0381.2330.00365Perceived complicationsContinuous 0: noneResponse ranging from not all (0) to very aware (1)Mean0.710 n0.539 230Mann- 7.6247.6244960.000Perceived content of diet informationResponse ranging from not all (0) to very 0: NoMean0.710 2300.539 266Mann- 7.6247.6244960.000Perceived source of informationResponse ranging from not at all (0) from not at all (0) source of from not at all (0)Mean0.710 2300.539 266Mann- 2.7667.6244960.00017Perceived appointmentsContinuous from not at all (0) to very important (1)N n231 2672670.163 26710.686Perceived if treatment is from not at all (0) from not at all (0) to very anxious (1)N n231 2672670.16310.000<	Perceived	Continuous	Response ranging not at	Mean	0.605	0.476	Mann–	5.855	497	0.000
of diabetesknowledgeable (1) n 231268Perceived knowledge of diabetes prior to diabetes prior toContinuous not at all (0) to very knowledgeable (1) n 231263Perceived diagnosisContinuous Response ranging from not at all (0) to very sizeSD0.2290.238WhitneyAwareness of complications:Categorical 1: one3: three+Frequencies166158 χ^2 11.2330.00365Awareness of complications:1: one153800000complications0: none00000000complications0: none00<	knowledge		all (0) to very	SD	0.238	0.251	Whitney			
Missing data1Perceived knowledge of diabetes prior to diagnosisContinuous not at all (0) to very knowledgeable (1)Mean0.203 p0.224 0.228 0.228 pMann- p-1.107 4964960.309diabetes prior to diagnosisknowledgeable (1) n 23126711.2330.00365diabetic complications:1: thre+ to neFrequencies166158 to z^2 11.2330.00365diabetic complications:1: one1538-1130.00365Perceived complicationsContinuous not all (0) to very awareness of not all (0) to very aware (1)Mean0.7100.539 to 2241Mann- to 7.6244960.000awareness of content of dietResponse ranging from not all (0) to very aware (1)Mean0.7100.539 to 2230Mann- to 2257.6244960.000aware (1)n230268GP as the best informationCategorical1: YesFrequencies176200 χ^2 0.16310.686information5D0.2240.231267Perceived keeping clinic if treatment is not at all (0)SD0.2020.227Whitney00Perceived if treatment is if treatment is from not at all (0)SD0.3050.262 <td>of diabetes</td> <td></td> <td>knowledgeable (1)</td> <td>п</td> <td>231</td> <td>268</td> <td></td> <td></td> <td></td> <td></td>	of diabetes		knowledgeable (1)	п	231	268				
Perceived knowledge of diabetes prior to diagnosisResponse ranging from not at all (0) to very SDMean SD0.229 0.2290.228 0.238Whitney -1.107 496 400.309 0.309Awareness of diabetic complications: no. of possible our of possible contributional awareness of complications: no. of possible contributional awareness of complications: no. at all (0) to very aware (1)Frequencies n166 158 72 0172 011.23 30.00365 0.000Perceived complications: no. of possible complicationsContinuous not all (0) to very aware (1)Mean not all (0) to very SD0.211 0.2550.539 0.241 0.255Mann- 7.6247.624496 0.000Perceived content of diet GP as the best informationContinuous response ranging from not at all (0) from not at all (0)Mean sond0.710 0.241 0.2550.539 Mann- 7.624496 0.000Perceived importance of importance of from not at all (0) from not at all (0)Mean SD0.711 0.2020.227 0.2270.163 110.686 0.00017Perceived if treatment is if treatment is if treatment is if treatment is from not at all (0) from not at all (0) very anxious (1)Mean m sond SD0.305 0.2620.2622.766 0.278485 0.000Perceived importance of from not at all (0) to very important (1)n m 222 22652.756 Missing data 330.000Perceived importance of from not				Missing data	1					
knowledge of diabetes prior to diagnosisnot at all (0) to very knowledgeable (1)SD 0.229 n 0.238 231 WhitneyAwareness of diabeticCategorical $2:$ two3: three+ $1:$ oneFrequencies166158 χ^2 11.233 0.00365 Awareness of complications: complications1: one51 72 7272727272Complications: complications1: one15380007.6244960.000awareness of not all (0) to very source of informationContinuous aware (1)Mean0.7100.539 2.25 Mann- Vintury7.6244960.000Graveness of not all (0) to very source of informationContinuous $1:$ YesFrequencies176200 χ^2 0.16310.686Perceived keeping clinic appointmentsContinuous from not at all (0)SD0.2020.227Whitney0.00017Perceived anxiety if treatment is rom at all (0)SD0.2020.227Whitney0.0017Perceived anxiety if treatment is rom not at all (0)SD0.3050.2620.2660.005Perceived if treatment is rom not at all (0)SD0.3050.2620.3754960.000Perceived if treatment is rom not at all (0)SD0.3050.2620.3754960.000Perceived control of if treatment is rom not at all (0)SD0.305	Perceived	Continuous	Response ranging from	Mean	0.203	0.224	Mann–	-1.107	496	0.309
diabetes prior toknowledgeable (1) n 231 267 diagnosis3: three+Frequencies 166 158 χ^2 11.23 3 0.00365 diabetic2: two 51 72 72 11.23 3 0.00365 diabetic2: two 51 72 72 72 7624 496 0.000 complications:1: one 0 0 0 0 0 0 0 0 complications:0: none 0 0 0 0 0 0 0 0 0 0 econtrol of dietmaware (1) n 230 268 0.163 1 0.686 0 0.666 0 0.163 1 0.686 source of 0 : No 56 68 76 0.163 1 0.686 0.00017 importance ofContinuousResponse ranging from not at all (0)SD 0.202 0.227 Whitney 0.00017 importance of appointmentsResponse ranging from not at all (0)SD 0.202 0.227 Whitney 0.005 Perceived anxiety if treatment is importance of to the very important (1) n 222 265 265 264 265 Missing data 1 1 Mann- 2.766 485 0.005 Perceived continuousResponse ranging from not at all (0) SD 0.238 0.245 0.379 496 0.000 Percei	knowledge of		not at all (0) to very	SD	0.229	0.238	Whitney			
diagnosisFrequencies166158 χ^2 11.2330.00365Awareness of diabetic2: two517211.2330.00365complications: complications1: one15387211.2330.00365complications: or opssible0: none000000complications000000000complications00 <td< td=""><td>diabetes prior to</td><td></td><td>knowledgeable (1)</td><td>п</td><td>231</td><td>267</td><td></td><td></td><td></td><td></td></td<>	diabetes prior to		knowledgeable (1)	п	231	267				
Awareness of diabeticCategorical3: interv 2: twoFrequencies160 1501537 7211.253: 0.00365diabetic2: two51727273747674complications:1: one0000000complicationsResponse ranging from not all (0) to veryMean0.7100.539Mann- 7.6247.6244960.000awareness of not all (0) to verySD0.2410.255Whitney000awareness of content of dietaware (1)n2302680000GP as the best source of informationCategorical1: YesFrequencies176200 χ^2 0.16310.686Perceived importance of appointmentsContinuousResponse ranging from not at all (0)Mean0.8540.781Mann- Mann-3.7834960.00017Perceived if treatment is if treatment is in to adhered to control ofResponse ranging from not at all (0)Mean0.6070.536Whitney00Perceived importance of if treatment is in to adhered to control of it to very important (1)n2212654850.005Perceived if treatment is in to at all (0)SD0.3050.2621461460.000Perceived if treatment is in to at all (0)SD0.2380.245Whitney4960.000 <td>diagnosis</td> <td>Catagoriaal</td> <td>2. thread</td> <td>Encaucination</td> <td>166</td> <td>150</td> <td>2</td> <td>11 00</td> <td>2</td> <td>0.00265</td>	diagnosis	Catagoriaal	2. thread	Encaucination	166	150	2	11 00	2	0.00265
under2.1 WO3172complications:1: one1538no. of possible0: none0complicationsPerceivedContinuousResponse ranging from not all (0) to veryMean0.7100.539Mann- 0.2557.6244960.000awareness of not all (0) to verySD0.2410.255Whitney0.000awareness of content of dietaware (1) n 2302681GP as the bestCategorical1: YesFrequencies176200 χ^2 0.16310.686source of information0: No5668680.0001766680.00017PerceivedContinuousResponse ranging from not at all (0)Mean0.8540.781Mann- Mann-3.7834960.00017Perceived keeping clinic appointmentsto very important (1) n 2312672672664850.005Perceived anxiety if treatment is not at all (0)SD0.3050.2622.7664850.005Perceived importance of from not at all (0)SD0.3050.2627664850.000Perceived into at all (0)SD0.2380.245Whitney4960.000Perceived importance of from not at all (0)SD0.2380.245Whitney4960.000Perceived importance of from not at all (0)SD0.2380.245Whitney<	diabotic	Categorical	2: two	rrequencies	100 51	138	χ	11.23	3	0.00305
Computation1.5 off1.5 offno. of possible complications 0 none 0 Perceived awareness of not all (0) to very 	complications:		1: one		15	38				
$\begin{array}{c} \mbox{complications} \\ \mbox{complications} \\ \mbox{Perceived} \\ \mbox{awareness of} \\ \mbox{not all (0) to very} \\ \mbox{aware (1)} \\ \mbo$	no, of possible		0: none		0	0				
Perceived awareness of nutritional content of dietContinuous not all (0) to very aware (1)Response ranging from not all (0) to very aware (1)Mean SD 0.710 0.539 0.241 Mann- 0.255 7.624 496 0.000 content of diet GP as the best source of informationCategorical $0: No$ 1: Yes $0: No$ Frequencies 176 56 200 χ^2 χ^2 0.163 1 1 0.686 Perceived source of informationContinuous $0: No$ Response ranging from not at all (0) SD Mean 0.202 0.781 0.202 Mann- χ^2 3.783 496 $0.00017Perceivedimportance ofkeeping clinicif treatment isnot ad hered toContinuousResponse rangingfrom not at all (0)wery anxious (1)Meann0.6072220.5362620.005Perceivedimportance ofif treatment isimportance offrom not at all (0)to very anxious (1)n2222222652650.3050.2620.2770.3050.3794960.000Perceivedimportance ofimportance ofimportance ofimportance ofimportance offrom not at all (0)from not at all (0)to very important (1)n2222652680.3794960.000$	complications				0	Ũ				
awareness of nutritional content of dietnot all (0) to very aware (1)SD 0.241 0.255 Whitney using dataGP as the best source of informationCategorical 0: No1: Yes 0: NoFrequencies 176 200 χ^2 0.163 1 0.686 Perceived expin clinic if treatment is into adhered toContinuous rom not at all (0) rom not at all (0)Mean 0.854 0.781 0.202Mann- 0.227 3.783 496 0.00017 Perceived if treatment is importance of contailed to to very important (1) n 231 267 267 Missing data 2.766 485 0.005 Perceived anxiety if treatment is importance of control ofContinuous from not at all (0) very anxious (1) n 222 265 Missing data 2.766 485 0.005 Perceived importance of control of if treatment is importance of to very important (1) n 222 265 Missing data 10 3 Perceived importance of to very anxious (1) n 222 265 Missing data 10 3 Perceived importance of to very important (1) n 222 265 Missing data 0.6379 496 0.000 Perceived importance of to very important (1) n 230 268 268 1000	Perceived	Continuous	Response ranging from	Mean	0.710	0.539	Mann–	7.624	496	0.000
nutritional content of dietaware (1) n 230268Content of dietMissing data1GP as the best source of informationCategorical1: Yes $0: No$ Frequencies176200 χ^2 0.16310.686source of information $0: No$ 56 68 -781 Mann- 3.783 496 0.00017 Perceived importance of appointmentsContinuous from not at all (0)SD 0.202 0.227 Whitney -766 485 0.005 Perceived anxiety if treatment is not at all (0)Response ranging from not at all (0)Mean 0.607 0.536 Whitney -766 485 0.005 Perceived anxiety if treatment is not at all (0)SD 0.305 0.262 -766 485 0.000 Perceived importance of control of to very anxious (1) n 222 265 -766 496 0.000 Perceived importance of control of diabetesContinuous from not at all (0)SD 0.238 0.245 WhitneyWean importance of importance of to very important (1) n 230 268 -766 496 0.000	awareness of		not all (0) to very	SD	0.241	0.255	Whitney			
content of dietMissing data1GP as the best source ofCategorical1: Yes 0: NoFrequencies176 56200 68 χ^2 0.16310.686source of information0: No5668680.000170.00017Perceived importance of appointmentsContinuous from not at all (0) to very important (1)Mean n 0.8540.781 202Mann- 2.7663.7834960.00017Perceived if treatment is if treatment is importance of if treatment is continuousResponse ranging from not at all (0)Mean SD0.6070.536 0.262Whitney2.7664850.005Perceived if treatment is if treatment is if treatment is if treatment is from not at all (0)SD0.3050.262111Perceived importance of control ofContinuous from not at all (0)SD0.3050.262111Perceived importance of control ofContinuous from not at all (0)SD0.3050.262111Perceived importance of control ofContinuous from not at all (0)SD0.2380.245Whitney4960.000Missing data importance of control offrom not at all (0)SD0.2380.245Whitney4960.000Missing data importance of control offrom not at all (0)SD0.2380.245Whitney11 <tr <tr="">Missing data importance of<</tr>	nutritional		aware (1)	п	230	268				
GP as the best source of informationCategorical 0: No1: Yes 0: NoFrequencies 56 176 56 200 χ^2 χ^2 0.163 1 0.686 Perceived importance of keeping clinic appointmentsContinuous from not at all (0) to very important (1)Mean n 0.854 231 0.781 202Mann- 277 3.783 496 496 0.00017Perceived appointmentsContinuous from not at all (0) to very anxious (1)Mean n 0.607 222 0.536 265WhitneyPerceived importance of from not at all (0) to very anxious (1)N n 222 265 265 265 Perceived importance of from not at all (0) to very important (1)N n 222 265 265 6.379 496 496 0.000 Perceived importance of control of diabetesContinuous from not at all (0) to very important (1) N N 222 265 265 6.379 496 496 0.000	content of diet			Missing data	1					
source of information $0: No$ 56 68 Perceived importance of appointmentsContinuous from not at all (0)Response ranging from not at all (0)Mean 0.854 0.781 0.202 Mann- 0.227 3.783 496 0.00017 keeping clinic appointmentsto very important (1) n n 231 267 Missing data 1 1 1 Mann- 2.766 485 0.005 Perceived anxiety if treatment is not at all (0)Response ranging from not at all (0)Mean 0.607 0.536 0.202 WhitneyPerceived importance of continuousResponse ranging from not at all (0) N 222 265 Missing data 10 3 Perceived importance of control of diabetesContinuous from not at all (0) SD 0.208 0.202 0.2045 Wean importance of importance of control offrom not at all (0) SD 0.238 0.245 $Whitney$ Wean importance of importance of control offrom not at all (0) SD 0.238 0.245 $Whitney$	GP as the best	Categorical	1: Yes	Frequencies	176	200	χ^2	0.163	1	0.686
informationPerceivedContinuousResponse ranging from not at all (0)Mean 0.854 0.781 Mann- Mann- 3.783 496 0.00017 importance of keeping clinicfrom not at all (0)SD 0.202 0.227 Whitney 2.766 485 0.005 appointmentsMissing data11Mann- 2.766 485 0.005 Perceived anxietyContinuousResponse ranging from not at all (0)Mean 0.607 0.536 Whitneyif treatment is if treatment isfrom not at all (0)SD 0.305 0.262 $Nean0.222265$	source of		0: No		56	68				
PerceivedContinuousResponse ranging from not at all (0)Mean 0.854 0.781 Mann- 3.783 496 0.00017 importance of keeping clinicfrom not at all (0)SD 0.202 0.227 Whitneyappointmentsto very important (1) n 231 267 Perceived anxietyContinuousResponse ranging from not at all (0)Mean 0.607 0.536 Whitneyif treatment is in treatment isfrom not at all (0)SD 0.305 0.262 0.262 Not adhered tovery anxious (1) n 222 265 Missing data 10 3 PerceivedContinuousResponse ranging from not at all (0)Mean 0.713 0.575 Mann-PerceivedContinuousResponse ranging from not at all (0)SD 0.238 0.245 Whitneyimportance of control offrom not at all (0)SD 0.238 0.245 Whitneydiabetesto very important (1) n 230 268	information									
importance of keeping clinicfrom not at all (0)SD 0.202 0.202 0.227 Whitneywheeping clinic appointmentsto very important (1) n 231 267 Perceived anxietyContinuousResponse ranging from not at all (0)Mean 0.607 0.536 WhitneyWhitneyfrom not at all (0)SD 0.305 0.262 0.262 Not adhered tovery anxious (1) n 222 265 PerceivedContinuousResponse ranging from not at all (0)Mean 0.713 0.575 Mann-PerceivedContinuousResponse ranging from not at all (0)Mean 0.713 0.575 Mann- 6.379 496 0.000 importance of control offrom not at all (0)SD 0.238 0.245 WhitneydiabetesWissing data2 268 0.202 0.268	Perceived	Continuous	Response ranging	Mean	0.854	0.781	Mann–	3.783	496	0.00017
keeping clinicto Very important (1) n 231 267 appointmentsMissing data11Mann- 2.766 485 0.005 Perceived anxietyContinuousResponse ranging from not at all (0)Mean 0.607 0.536 Whitneyif treatment isfrom not at all (0)SD 0.305 0.262 0.262 not adhered tovery anxious (1) n 222 265 Missing data103PerceivedContinuousResponse ranging from not at all (0)Mean 0.713 0.575 Mann- 6.379 496 0.000 importance of control offrom not at all (0)SD 0.238 0.245 WhitneydiabetesMissing data2 268	importance of		from not at all (0)	SD	0.202	0.227	Whitney			
appointmentsMissing data11Manu-2.7664630.005Perceived anxietyContinuousResponse ranging from not at all (0)Mean0.6070.536Whitneyint reatment isfrom not at all (0)SD0.3050.262not adhered tovery anxious (1)n222265Missing data103PerceivedContinuousResponse ranging from not at all (0)Mean0.7130.575Mann-Missing data01030.2380.245Whitneyimportance of control offrom not at all (0)SD0.2380.245WhitneydiabetesMissing data2	keeping clinic		to very important (1)	n Missing data	231	267	Mann	2766	105	0.005
if treatment is from not at all (0) SD 0.305 0.262 not adhered to very anxious (1) n 222 265 Missing data 10 3 Perceived Continuous Response ranging Mean 0.713 0.575 Mann- 6.379 496 0.000 importance of from not at all (0) SD 0.238 0.245 Whitney control of to very important (1) n 230 268 Missing data 2 268	Porceived anviety	Continuous	Perpense ranging	Moon	1	1	Whitnow	2.766	400	0.005
not adhered to very anxious (1) n 222 265 Perceived Continuous Response ranging Mean 0.713 0.575 Mann- 6.379 496 0.000 importance of from not at all (0) SD 0.238 0.245 Whitney control of to very important (1) n 230 268	if treatment is	Continuous	from not at all (0)	SD	0.007	0.330	winney			
InterventionInterventionInterventionInterventionPerceivedContinuousResponse ranging from not at all (0)Missing data103Mean0.7130.575Mann-6.3794960.000importance of control offrom not at all (0)SD0.2380.245WhitneydiabetesMissing data2	not adhered to		very anxious (1)	n	222	265				
PerceivedContinuousResponse ranging from not at all (0)Mean0.7130.575Mann-6.3794960.000importance of control offrom not at all (0)SD0.2380.245WhitneydiabetesMissing data2	not autored to		,	Missing data	10	3				
importance of control offrom not at all (0)SD 0.238 0.245 Whitneydiabetesto very important (1) n 230 268	Perceived	Continuous	Response ranging	Mean	0.713	0.575	Mann–	6.379	496	0.000
control of to very important (1) <i>n</i> 230 268 diabetes Missing data 2	importance of		from not at all (0)	SD	0.238	0.245	Whitnev			
diabetes Missing data 2	control of		to very important (1)	п	230	268	5			
	diabetes			Missing data	2					

Table 2 Results of the univariate analysis for the university examined	Table 2	Results of the	univariate	analysis fo	or the	different	issues	examined
---	---------	----------------	------------	-------------	--------	-----------	--------	----------

p-values in bold denote significant effects.

Table 3	Multivariate	analysis	of factors	which	showed	significance	in	Table	2
---------	--------------	----------	------------	-------	--------	--------------	----	-------	---

	Independent variables				
	Race	Income	Education level		
Perceived knowledge of diabetes	Ρ=0.000 (β=-0.225)	P=0.283 (β=0.052)	Ρ=0.0045 (β=0.138)		
Awareness of diabetic complications: no.	P=0.001 (β =-0.154)	P=0.95 (β=0.003)	P=0.015 (β=0.12)		
of possible complications					
Perceived awareness of nutritional content of diet	P=0.000 (β=-0.325)	P=0.665 (β=0.021)	P=0.355 (β=0.044)		
Perceived importance of keeping clinic appointments	P=0.000 (β=0.161)	P=0.345 (β=0.047)	$P=0.06 \ (\beta=-0.092)$		
Perceived anxiety if treatment is not adhered to	P=0.074 (β=-0.088)	P=0.938 (β=0.003)	P=0.0617 (β=0.095)		
Perceived importance of control of diabetes	Ρ=0.00 (β=-0.272)	Ρ=0.47 (β=0.035)	Ρ=0.302 (β=0.050)		

anxiety if treatment was not adhered to as well as lower importance of control of the diabetes. No significant differences existed in knowledge of diabetes prior to diagnosis.

Significant dependent variables, such as awareness of diabetes and importance of keeping clinical appointments, could be influenced by other variables including socioeconomic and educational status differences between the two groups. We carried out multivariate analysis on factors that showed to be significant in the univariate analysis in Table 2. These are shown in Table 3 and were carried out to examine the contributions of race, education age, and income levels. Race showed significance with all the issues examined except 'perceived anxiety if treatment was not adhered to', although this was significant to 93%. The level of education was significance with any of the issues examined.

Some limitations of the study need to be acknowledged. In cases where perceived knowledge and awareness have been examined, we have to rely on the patient's ability to report accurately. In some cases, this may be over- or underestimated, for example, Asians may be more aware of how little they know, whereas the Caucasian population may be giving themselves more credit. Asians reported a lower awareness of diabetes and this was also confirmed by their identification of a lower number of named organs that could be affected by diabetes. Although racial differences in responses to the technique may have existed to an extent, we do not believe that it influenced the results a great deal.

Discussion

The study shows a lack of understanding of diabetes and its complications by one racial group. Undoubtedly, various issues interlink with each other in a complicated and, at present, rather undetermined manner, to produce an overall picture of lower awareness and self-help in the South Asian population. Although genetic effects may play a role in the higher prevalence of diabetes in the Asian population,²⁵ lifestyle issues such as exercise are also very important^{26,27} and sedentary lifestyles may place Asians in the high-risk category.^{28,29} Although information to promote increased physical activity and control obesity has been promoted by health information systems, this study highlights a lack of understanding of these important issues in Asians. In addition, a lower awareness of the nutritional content of the diet was demonstrated. We hypothesise that various issues, including inadequate or inappropriate manner of dissemination of health information as well as the inability of the patients to uptake and retain the important information are responsible.

In order to ensure dissemination of important information, cultural and religious influences need to be understood. Language barriers would possibly play a major role.³⁰ The patients' having to rely on relatives or interpreters may lead to information being lost or changed. A study by Ebden et al^{31} claimed that 16–39% of the simplest questions can be mistranslated by relatives. Communication difficulties may also make it difficult to rearrange appointments. Religious obligations, such as fasting, would make control of diabetes more difficult.³² Previous studies have shown that, when communication problems are overcome and people are approached in a culturally sensitive way, they are receptive to advice that advocates changes in lifestyle and the use of preventative services.³³ Although this may be difficult, especially for older females, for example, written information in a native language would not be appropriate for people who are illiterate, other methods, such as pictorial flashcards, have been used in other parts of the country.²¹ Link-workers who explain reasons for regular appointments and provide encouragement would benefit.13 Although quite a number of these approaches are currently being employed in different parts of the country, the results from this study suggest that fundamental differences in important diabetes-related issues between Asian and Caucasian patients still exist.



References

- British Diabetic Association. Counting the Cost: the Real Impact of Non-insulin Dependent Diabetes. King's Fund: London, 1996.
- 2 Poon-King T, Henry MV, Rampersand F. Prevalence and natural history of diabetes in Trinidad. *Lancet* 1968; I: 155–160.
- 3 Jackson WPU. Epidemiology of diabetes in South Africa. In: Miller M, Bennett PH (eds). *Advances in Metabolic Disorders*, Vol 9. Academic Press: New York, 1978, pp 111–146.
- 4 Zimmet P, Taylor R, Ram P, King H, Sloman G, Raper LR *et al.* Prevalence of diabetes and impaired glucose tolerance in the biracial (Melanesian and Indian) population of Fiji: a rural–urban comparison. *Am J Epidemiol* 1983; **118**: 673–688.
- 5 McKeigue PM, Miller GJ, Marmot MG. Coronary heart disease in South Asians overseas—a review. J Clin Epidemiol 1989; 42: 597–609.
- 6 McKeigue P, Sevak L. Coronary Heart Disease in South Asian Communities: A Manual for Health Promotion. Health Education Authority: London, 1994.
- 7 Mather HM, Keen H. The Southall diabetes survey: prevalence of known diabetes in Asian and Europeans. *BMJ* 1985; **291**: 1081–1084.
- 8 Samanta A, Burden AC, Fent B. Comparative prevalence of non-insulin dependent diabetes mellitus in Asian and White Caucasian adults. *Diab Res Clin Pract* 1987; 4: 1–6.
- 9 Simmonds D, Williams DRR, Powell MJ. Prevalence of diabetes in a predominantly Asian community: preliminary findings of the Coventry diabetes study. *BMJ* 1989; 289: 18–21.
- 10 Dodson PM, Krizinger EE, Clough CG. Diabetes mellitus and retinal vein occlusion in patients of Asian, West Indian and White European origin. *Eye* 1992; 6: 66–68.
- 11 Greenhalgh PM. Diabetes in British South Asians: nature, nurture, and culture. *Diab Med* 1997; **14**: 10–18.
- 12 Aiello LP, Cahill MT, Wong JS. Systemic considerations in the management of diabetic retinopathy. *Am J Ophthalmol* 2001; **132**: 760–776.
- 13 Whitemeans SI. Conceptualising race in economic models of medical utilization—a case study of community-based elders and the emergency room. *Health Serv Res* 1995; **30**: 207–223.
- 14 Hawthorne K. Accessibility and use of health care services in the British Asian Community. *Fam Pract* 1994; 4: 453–459.
- 15 Ford ES, Cooper RS. Racial–ethnic differences in health care utilization of cardiovascular procedures–a review of the evidence. *Health Serv Res* 1995; **30**: 237–252.
- 16 Baker DW, Stevens CD, Brook RH. Determinants of emergency department use. Are race and ethnicity important? Ann Emerg Med 1996; 28: 677–682.
- 17 Ritch AES, Ehtisham M, Guthrie S, Talbot JM, Luck M, Tinsley RN. Ethnic influence on health and dependency of elderly inner city residents. *J R Coll Physicians Lond* 1996; **30**: 215–220.

- 18 Mitchell AA, Sedlacek WE. Ethnically sensitive messengers—an exploration of racial attitudes of healthcare workers and organ procurement officers. J Nat Med Assoc 1996; 88: 349–352.
- 19 Hawthorne K. South Asian diabetic patients need more education about their illness. *BMJ* 1997; **314**: 1486.
- 20 Hawthorne K, Tomlinson S. Pakistani Moslems with type 2 diabetes mellitus: effect of sex, literacy skills, known diabetic complications and place of care on diabetic knowledge, reported self monitoring management and glycaemic control. *Diab Med* 1999; 16: 591–597.
- Hawthorn K, Mello M, Tomlinson S. Cultural and religious influences in diabetes care in Great Britain. *Diab Med* 1993; 10: 8–12.
- 22 Hawthorne K. Asian diabetics attending a British hospital clinic: a pilot study to evaluate their care. *Br J Gen Pract* 1990; **40**: 243–247.
- 23 Simmons D, Meadows KA, Williams DRR. Knowledge of diabetes in Asians and Europeans with and without diabetes. The Coventry diabetes study. *Diab Med* 1991; 8: 651–656.
- Lillie-Blanton M, Hoffman SC. Conducting an assessment of health needs and resources in a racial/ethnic minority community. *Health Serv Res* 1995; 30: 225–236.
- 25 Pearson ER, Hattersley AT. Unravelling the heterogeneity of non-insulin dependent diabetes. J R Coll Physicians Lond 2000; 34(4): 332–335.
- 26 Perry IJ, Wannamethee SG, Walker MK, Thompson AG, Whincup PH, Shaper AG. Prospective study of risk factors for development of non-insulin dependent diabetes in middle aged British men. *BMJ* 1995; **310**: 560–564.
- 27 Manson JE, Nathan DM, Krolewski AS, Stampfer MJ, Willet WC, Hennekens CH. A prospective study of exercise and incidence of diabetes among US male physicians. J Am Med Assoc 1992; 268: 63–67.
- 28 Samanta A, Burden AC, Jagger C. A comparison of the clinical features and vascular complications of diabetes between migrant Asians and Caucasians in Leicester, UK. *Diab Res Clin Pract* 1991; 14: 205–214.
- 29 UK Prospective Diabetes Study (UKPDS) group. Differences between Asian, Afro-Caribbean and White Caucasian Type 2 diabetic patients at diagnosis of diabetes (UKPDS 11). qDiab Med 1994; 11: 670–677.
- 30 Wright CM. Language and communication problems in an Asian community. *J R Coll Gen Pract* 1983; **33**: 101–104.
- 31 Ebden P, Carey OJ, Bhatt A, Harrison B. The bilingual consultation. *Lancet* 1988; i: 347
- 32 Aslam M, Healy MA. Compliance and drug therapy in fasting Moslem patients. *J Clin Hosp Pharm* 1986; **11**: 321–325.
- 33 Bhopal RS. The inter-relationship of folk, traditional and western medicine within an Asian community in Britain. Soc Sci Med 1986; 22: 99–105.