

## PAPERS AND SHORT REPORTS

**The Southall Diabetes Survey: prevalence of known diabetes in Asians and Europeans**

HUGH M MATHER, HARRY KEEN

**Abstract**

A house to house inquiry for patients with known diabetes was carried out in a defined area of Southall, west London, which contained over 34 000 Asians and 27 000 Europeans in the 1981 Census: 1143 diabetic patients were ascertained, of whom 761 were Asian and 324 European. The prevalence adjusted for age of known diabetes in Asians was at least 3.8 times higher than that in Europeans. For patients aged between 40 and 64 years it was at least five times higher, was over 12% in Asians aged 60-69, and over 8% in those aged 50-59. These data are important in planning for the care of diabetic patients in health districts with large Asian communities. The causes and later consequences of this exceptionally high prevalence require further study.

**Introduction**

People from the Indian subcontinent ("Asian") who have settled in other parts of the world seem to be peculiarly susceptible to diabetes mellitus. The results of studies in South Africa,<sup>1-3</sup> Fiji,<sup>4</sup> Trinidad,<sup>6</sup> and Singapore<sup>7</sup> have shown a consistently higher prevalence in Asian immigrants than in other local groups. There is some indirect evidence, from Hospital Activity Analysis data<sup>8-9</sup> and mortality statistics,<sup>10-11</sup> that the prevalence of diabetes may also be higher in Asians who live in Britain. No formal prevalence studies have been performed in Britain, however. We have therefore ascertained the frequency of known diabetes from a house to house survey of all residents living in an

area of Southall, west London, which contains comparable numbers of Asians and Europeans.

**Methods****MAIN SURVEY**

Southall has had a large influx of relatively young people from the Indian subcontinent, and smaller numbers from East Africa, the Caribbean, and elsewhere, over the past 35 years and is now a well integrated, multiracial community. Most Asians are Sikhs from the Punjab, but there are also many Hindus from the Punjab and Gujarat. The area of the survey, which had been defined for the 1981 Census, contained 66 488 "usually resident" persons and 18 538 "private households" in the 1981 Census. A team of 24 volunteers, who were mainly Asian speaking nurses and other health personnel at Ealing Hospital, carried out the inquiry, usually working in pairs at evenings and weekends. They visited every household and inquired about diabetes in standard terms—"I am from Ealing Hospital, and we are doing a survey on diabetes: is there anyone living in this house who has diabetes?" If the response was positive a questionnaire was completed. The volunteers were individually taught how to administer the questionnaire and each was accompanied by HMM on their first visit. The questionnaire elicited information on age, known duration of diabetes, treatment, country of birth, religion, year of coming to Britain (if born abroad), place of residence in 1981, and estimated height and weight. The survey received extensive publicity in the local press and on radio and television, and the cooperation from the community was excellent. A response was obtained from roughly 70% of households in the first survey. A second approach to non-responding households raised the response rate to 89%. The fieldwork was completed in six and a half weeks in September and October 1984 and took 800 hours. Data were analysed on a microcomputer at Ealing Hospital and the significance of differences evaluated using standard *t* tests. The survey was approved by the Ealing Hospital ethical committee.

**CLINIC ASCERTAINMENT STUDY**

A further study was undertaken to assess the completeness of the house to house ascertainment. A list of 815 patients who had attended one of three local diabetic clinics and had lived in Southall was analysed: 469 of these patients had been ascertained in the survey. The addresses of the remainder were visited. In 201 instances the patient was no longer resident there, having either moved or died.

Ealing Hospital, Southall, Middlesex UB1 3HW  
HUGH M MATHER, MD, MRCP, consultant physician

Guy's Hospital Medical School, London SE1 9RT  
HARRY KEEN, MD, FRCP, professor of human metabolism

Correspondence to: Dr Mather.

There was no reply at 32 addresses, and 20 people denied having diabetes at the time. Ninety three diabetic patients who had not been ascertained in the survey were found, representing an underascertainment of at least 16%.

#### CENSUS DATA

At the 1981 Census Southall contained 66 488 "usually resident" persons, of whom 65 057 (97.8%) were in "private households." There was no ethnic question in the census so information on ethnic origin has been inferred from the "birthplace of the household head" for those living in private households. This is generally valid because

and 29 the age specific prevalence was lower in Asians than Europeans, but above this age Asian rates rose sharply, whereas European rates rose more slowly. Using unadjusted 1981 Census data the prevalence in Asians exceeded that in Europeans more than sevenfold for ages 45 to 69, with almost a 10-fold excess between ages 50 and 54 (fig 2). More than 10% of Asians aged 50 to 59 were diabetic and more than 17% aged 60-69. Although the three and a half year census adjustment reduces these prevalence rates, there is still at least a fivefold excess of Asians in the age group 40-64, with a peak prevalence ratio of 7.6 in the age group 50 to 54. More than 8% of Asians aged 50 to 59 are diabetic and more than 12% aged 60 to 69. Given an Asian population structure that is identical with that of the Europeans, the overall prevalence of diabetes would be 6.4%, or 5.3 times that of the Europeans (1.2%), using the 1981 Census data. After the three and a half year

Age specific prevalence of known diabetes in Asians and Europeans

Age (years)	Asians				Europeans			
	Population (1981)	No of diabetic patients	Prevalence (unadjusted)	Prevalence (adjusted)	Population (1981)	No of diabetic patients	Prevalence (unadjusted)	Prevalence (adjusted)
0-4	4215	0			1250	0		
5-9	3400	3	0.1	0.1	1370	0		
10-14	3575	4	0.1	0.1	1990	0		
15-19	3340	2	0.1	0.1	2165	5	0.2	0.2
20-24	3840	6	0.2	0.2	2090	9	0.4	0.4
25-29	3735	8	0.2	0.2	1685	5	0.3	0.3
30-34	2660	26	1.0	0.8	1725	6	0.3	0.4
35-39	1920	42	2.2	1.7	1470	8	0.5	0.5
40-44	2020	71	3.5	3.6	1455	10	0.7	0.7
45-49	1705	115	6.7	6.0	1575	13	0.8	0.9
50-54	1315	134	10.2	8.4	1720	18	1.0	1.1
55-59	975	109	11.2	9.0	1905	30	1.6	1.7
60-64	665	111	16.7	12.6	1605	35	2.2	1.9
65-69	370	71	19.2	12.3	1600	41	2.6	2.5
70-74	200	31	15.5	9.7	1405	50	3.6	3.2
75-79	180	17	9.4	8.8	1105	43	3.9	3.3
80-84	25	11	44.0	8.3	550	31	5.6	3.3
85-90	5	0			240	14	5.8	3.1
>90	5	0			75	6	8.0	2.5

in 1981 there were few Asian families whose "household head" had been born in Britain. From data from the Office of Population Censuses and Surveys (OPCS table 1285U) people whose head of household had been born in the Indian subcontinent or East Africa were designated "Asian," those whose head of household had been born in the Caribbean or the rest of Africa were designated "Afro-Caribbean," and the remainder were designated "European." Thus 34 230 (52.6% of the total) were Asian, 27 075 (41.6%) European, and 3780 (5.8%) Afro-Caribbean. The age distribution of the Asian and European populations differed considerably (table, fig 1). About twice as many Asians as Europeans were aged under 20, roughly equal numbers were aged 35-54, and over three times more Europeans were aged 55 and over. The sex distribution in the different ethnic and age groups was unavailable.

#### Results

In the survey 1050 people with diabetes were ascertained and a further 93 in the clinic ascertainment study, a total of 1143, of whom 761 (67%) were Asian, 324 (28%) European, and 44 (4%) Afro-Caribbean. Eleven Anglo-Indian, two Arabic, and one Chinese diabetic patient were excluded from the analyses. The crude prevalence in Asians (based on number of people in private households in 1981) was 2.2%, whereas that in Europeans was 1.2% and in Afro-Caribbeans 1.2%.

**Age and age specific prevalence**—There were pronounced differences between the age distributions of the Asian and European diabetic patients (table): five times more Asians (608) than Europeans (120) aged 30-64 had diabetes. Below age 30, however, the numbers were similar: 23 Asians and 19 Europeans, and at age 70 and over more Europeans (144) than Asians (59) had diabetes. Since the census data were collected three and a half years before this survey was carried out age specific prevalence rates for diabetes were calculated in two ways. The first assumed that the age distributions of the Asian and European populations had not changed between the census and the survey. The second assumed that both populations aged by 3.5 years, and that 70% of the people in each five year age group had advanced into the next age band. This has relatively little effect on the European age distribution but greatly affects that of the Asians, and hence their calculated age specific prevalences (table, fig 1). Between ages 15

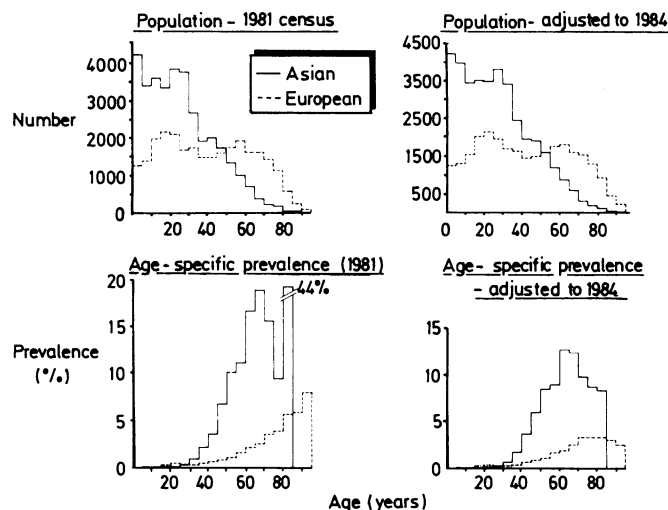


FIG 1—Population age distribution, and prevalence of known diabetes in Asians and Europeans in Southall based on 1981 Census and adjusted to 1984 (see text).

census adjustment the calculated overall prevalence in Asians becomes 4.6%, or 3.8 times greater than the European rate.

**Sex**—More Asian men (453) than women (308) reported having diabetes (1.47:1). Using the sex ratio derived from all Asians in the London Borough of Ealing (OPCS table 1286), 64% of whom lived in Southall, the overall crude prevalence in Asian men was 2.6% and that of women 1.9%. Among Europeans the number of men and women with diabetes was identical (162), as was their overall crude prevalence (1.2%).

**Age at diagnosis and known duration**—Roughly seven times as many Asians (523) as Europeans (76) had been diagnosed between the ages of 30 and 54 (fig 3), but similar numbers of Asians (22) and Europeans (27) had been diagnosed under age 25. The mean and median known

durations of diabetes in Asians were 6.6 and 5 years and in Europeans 9.0 and 6 years respectively.

**Treatment**—One hundred and thirty five (18%) Asians and 96 (30%) Europeans were treated with insulin; 477 (64%) Asians and 148 (46%) Europeans were taking oral hypoglycaemic treatment; 138 (18%) Asians and 76 (24%) Europeans were treated by dietary measures alone.

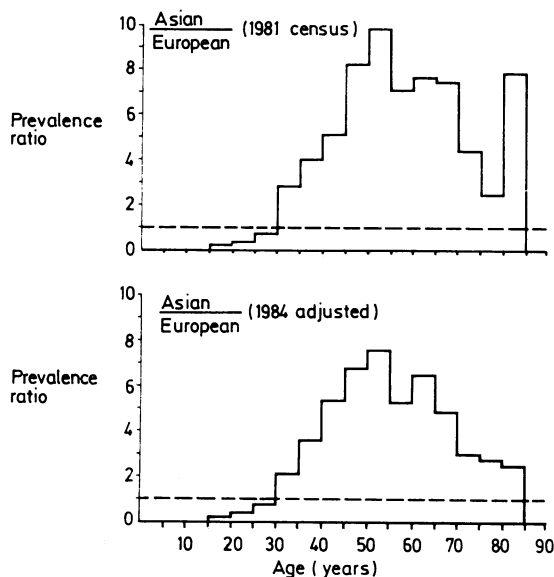


FIG 2—The ratio of Asian to European prevalence of known diabetes, based on 1981 Census and adjusted to 1984 (see text).

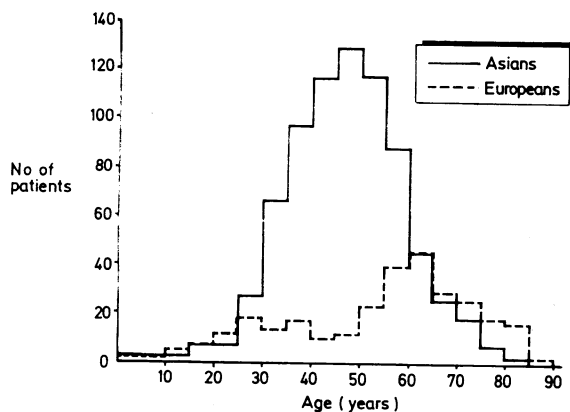


FIG 3—The age at diagnosis of diabetes in Asians and Europeans.

**Height, weight, and mass**—Estimates of height and weight were obtained from 424 Asians and 232 Europeans, and from these body mass index was calculated, using the formula:  $BMI = \text{weight (kg)} / \text{height (m)}^2$ . The mean body mass index did not differ significantly between the two groups ( $25.7 \pm 3.9$  and  $25.6 \pm 4.3$  respectively). The mean index was significantly lower in Asian men than in women ( $25.2 \pm 3.7$  v  $26.7 \pm 4.3$ ;  $p < 0.001$ ) but did not differ significantly between European men and women ( $25.5 \pm 3.9$  v  $25.7 \pm 4.8$ ).

**Further details on Asian patients with diabetes**—The mean (SD) time since arrival in Britain was 16.2 (6.5) years, and the mean (SD) age at arrival was 37.1 (13.1) years. Ten per cent had been diagnosed before coming to Britain. In the remainder the mean (SD) interval between arrival and diagnosis was 11.5 (6.5) years. Eighty two per cent were Punjabi and 9% Gujarati; 57% were Sikh, 26% Hindu, and 12% Moslem; 77% were born in India, 12% in East Africa, and 7% in Pakistan. Ten patients (1%) aged 10 to 22 were born in Britain. Twenty eight per cent were vegetarian. Seventy one per cent were attending a hospital diabetic clinic.

## Discussion

The prevalence of known diabetes in Asians living in Southall is appreciably higher than in Europeans, especially in the middle years of life. In Asians aged 40 to 64 years there is at least a five-fold excess prevalence, with rates of at least 8% between ages 50 and 59 and 12% between 60 and 69. The results of diagnostic surveys have shown that the numbers of known and undiagnosed diabetic patients are approximately equal in urban Asian communities in India<sup>12</sup> and South Africa.<sup>1</sup> Thus the total prevalence (known and undiagnosed) in Asians living in Southall may be much higher. Our data come from two large ethnic groups who live together in a well integrated community and use the same primary health care system. Thus the large differences in prevalence appear to be genuine and not an artefact of differing levels of ascertainment.

The high prevalence rates in Asians are broadly consistent with those in studies from South Africa,<sup>1-3</sup> Fiji,<sup>4,5</sup> Trinidad,<sup>6</sup> and Singapore,<sup>7</sup> in which blood or urine tests or both were used to identify diabetes in smaller groups of patients. In each survey the prevalence in Asians was higher than in other local populations. The Southall community differs from those previously surveyed in having immigrated recently and in comprising mainly Sikhs from the Punjab. Mortality statistics, however, suggest that diabetes may be unduly common in other subgroups of Asians in Britain.<sup>11</sup> The prevalence rates in Southall may thus be reflected in other Asian communities, as suggested by the results of studies from Birmingham,<sup>8</sup> Leicester,<sup>9</sup> and Harrow (R M Greenwood and R F Mahler, personal communication, 1985).

In India the prevalence of diabetes is not unusually high. In a study of 34 194 people the total prevalence (both known and new cases) was 1.8%.<sup>12</sup> In urban areas the prevalence of known diabetes was approximately 1.1%. Despite reservations owing to the differences in method, it is likely that the prevalence in Asians in Southall is higher than in India, as has been suggested for Asian immigrants elsewhere.<sup>3,13</sup>

The three and a half year adjustment made to the 1981 Census data is likely to result in a substantial underestimate of age specific prevalence rates; conversely, the use of unadjusted 1981 Census data might produce an overestimate. The true prevalences probably lie between the two sets of estimates. Ninety three per cent of Asians with diabetes were resident in Southall in 1981, and only 3.5% had come to Britain since then. Thus the high prevalence rates are not due to a large influx of people with diabetes since the census. Some non-diabetic patients may have claimed to be diabetic, but this is unlikely owing to the detailed nature of the questionnaire. Against this must be set the under-ascertainment shown in the follow up study. None of these factors could account for the noticeable differences observed between the Asian and European prevalence rates.

We cannot make a clear distinction between insulin dependent and non-insulin dependent diabetes in either the Asians or the Europeans. Relatively fewer Asians were receiving insulin than Europeans, and in the age group 15-29 the prevalence in Asians was less than that in Europeans, although, surprisingly, no European children were ascertained. Clinical experience has shown that classical insulin dependent ketosis prone diabetes is uncommon in Asians.<sup>3,14</sup> The severity of hyperglycaemia, however, often necessitates insulin treatment for adequate control.

Our data on body mass index are derived from the estimated heights and weights of 56% and 72% of the Asian and European diabetic patients respectively and must be regarded as provisional. Nevertheless, the results suggest that there are no major differences in adiposity between the two groups. A close relation between prevalence of diabetes and adiposity has, however, been shown in Asians in South Africa and in other ethnic groups.<sup>3,15</sup> We do not know whether obesity is more prevalent in the Asian than in the European populations or whether a given degree of adiposity is more diabetogenic in Asians. Other relevant environmental factors may include alterations to diet and reduced physical activity. More information about these potential factors

is needed if rational measures are to be implemented in the community to reduce the high prevalence.

The long term morbidity of diabetes in British Asians is unknown. Observations on over 400 Asian and 490 European diabetic patients attending Ealing Hospital suggest that the prevalence of retinopathy and symptomatic ischaemic heart disease is similar in the two groups. In view of the earlier age of presentation in Asians and the clear relation between the duration of diabetes and the development of complications we might envisage a considerable morbidity from retinal, renal, neurological, and arterial disease over the next few decades.

The results of this survey are important in planning services for diabetic patients in health districts with large Asian communities. There are over one million Asians in Britain, and their age distribution is similar to that in Southall. As more young Asians reach middle age an appreciable increase in the number diagnosed as diabetic may be expected. More Asian speaking dietitians and more educational aids for Asian patients with diabetes are needed. Research should be directed towards defining possible environmental factors, evaluating preventive measures, and protecting this at risk population from the complications of the disease.

We thank Professor P J S Hamilton, Professor D J P Barker, and Dr J Ashley for invaluable advice; Mr S Smales, Mr R Coomber, Dr P Briggs, Dr H B McMichael, Dr G P Blanshard, Mrs C Kelly, Mr J F Mullen, and Mrs J Wigmore for much help; Miss J Welch for immense help in organising the survey; and Mrs S Sharma, Mr P Singh, Mrs H Pandya, and all the other members of the survey team for dedication, enthusiasm, and hard work. The survey was supported by Ealing

Health Authority and generous computer facilities were provided by Nordisk Limited.

## References

- 1 Marine N, Vinik AI, Edelstein I, Jackson WPU. Diabetes, hyperglycaemia and glycosuria among Indians, Malays and Africans (Bantu) in Cape Town, South Africa. *Diabetes* 1969;18:840-57.
- 2 Goldberg MD, Marine N, Ribeiro F, Campbell GD, Vinik AI, Jackson WPU. Prevalence of glycosuria and diabetes among Indians and Bantu. *S Afr Med J* 1969;43:733-8.
- 3 Jackson WPU. Epidemiology of diabetes in South Africa. In: Miller M, Bennett PH, eds. *Advances in metabolic disorders*. Vol 9. New York: Academic Press, 1978: 111-46.
- 4 Cassidy JT. Diabetes in Fiji. *NZ Med J* 1967;66:167-72.
- 5 Zimmet P, Taylor R, Ram P, 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;118:673-88.
- 6 Poon-King T, Henry MV, Rampersad F. Prevalence and natural history of diabetes in Trinidad. *Lancet* 1968;i:155-60.
- 7 Cheah JS, Lui KF, Yeo PPB, Tam BY, Tan YT, Ng YK. Diabetes mellitus in Singapore: results of a country-wide population survey. In: Ahuja MMS, ed. *Epidemiology of diabetes in developing countries*. New Delhi: Interprint, 1979: 93-102.
- 8 Cruickshank JK, Beevers DG, Osbourne VL, Haynes RA, Corlett JCR, Selby S. Heart attack, stroke, diabetes, and hypertension in West Indians, Asians, and whites in Birmingham, England. *Br Med J* 1980;281:1108.
- 9 Donaldson LJ, Taylor JB. Patterns of Asian and non-Asian morbidity in hospitals. *Br Med J* 1983;286:949-51.
- 10 Marmot MG, Adelstein AM, Bulusu L. *Immigrant mortality in England and Wales, 1970-78*. London: HMSO, 1984. (OPCS Studies on Medical and Population Subjects, No 47.)
- 11 Balarajan R, Bulusu L, Adelstein AM, Shukla V. Patterns of mortality among migrants to England and Wales from the Indian subcontinent. *Br Med J* 1984;289:1185-7.
- 12 Ahuja MMS. Epidemiological studies on diabetes mellitus in India. In: Ahuja MMS, ed. *Epidemiology of diabetes in developing countries*. New Delhi: Interprint, 1979:29-38.
- 13 Taylor R, Zimmet P. Migrant studies in diabetes epidemiology. In: Mann JJ, Pyorala K, Teuscher A, eds. *Diabetes in epidemiological perspective*. Edinburgh: Churchill Livingstone, 1983:58-77.
- 14 Odugbesan O, Barnett AH. Asian patients attending a diabetic clinic. *Br Med J* 1985;290:1051-2.
- 15 West KM. *Epidemiology of diabetes and its vascular lesions*. New York: Elsevier, 1978.

(Accepted 15 August 1985)

# Postmarketing surveillance of the safety of cimetidine: mortality during second, third, and fourth years of follow up

D G COLIN-JONES, M J S LANGMAN, D H LAWSON, M P VESSEY

## Abstract

A previous report analysed the pattern of mortality during the first year of follow up among 9928 patients taking cimetidine who were recruited to a postmarketing drug surveillance study in Glasgow, Nottingham, Oxford, and Portsmouth. A further analysis has now been conducted extending the period of follow up to four years.

The 12 month report noted that cimetidine was being given, knowingly or unknowingly, in the late stages of

many diseases and also to counter the adverse gastric effects of other drugs used in the treatment of serious disorders. This finding was underlined by a steady fall in the excess death rate among cimetidine users with increasing length of follow up, such that by the fourth year the pattern of observed deaths was not much different from that expected on the basis of national rates.

Some excess of observed over expected deaths from gastric cancer, lung cancer, and urinary disorders was still apparent after four years of follow up, but there was no evidence that cimetidine was responsible. Indeed, no fatal disorder emerged as being associated with cimetidine during the follow up period. Deaths from the complications of disease related to gastric acid occurred in only 38 of the 9928 subjects over the four years.

These findings provide further evidence of the safety of cimetidine.

## Introduction

The methods used in our study of the safety of cimetidine have been described in detail in an interim report on gastric cancer<sup>1</sup> and in reports on mortality<sup>2</sup> and morbidity<sup>3</sup> during the first year of follow up. In brief, four centres (Glasgow, Nottingham, Oxford, and Portsmouth) took part in the investigation and a

Queen Alexandra Hospital, Cosham, Portsmouth  
D G COLIN-JONES, MD, FRCP, consultant physician

Department of Therapeutics, University Hospital, Nottingham  
M J S LANGMAN, MD, FRCP, professor

Department of Clinical Pharmacology, Royal Infirmary, Glasgow  
D H LAWSON, MD, FRCPED, professor

Department of Community Medicine and General Practice, Radcliffe Infirmary, Oxford  
M P VESSEY, MD, FRCPED, professor

Correspondence to: Professor M P Vessey, Department of Community Medicine and General Practice, Gibson Laboratories Building, Radcliffe Infirmary, Oxford OX2 6HE.