

## The prevalence of eye disease in Leicester: a comparison of adults of Asian and European descent

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### Summary

Random samples of people aged 40 years and over were drawn from lists of patients registered with two neighbouring inner-city general practices: one predominantly with Asian patients and the other predominantly with European patients. The people selected were invited to attend specially arranged eye clinics for examination by an ophthalmologist and an optician. We examined 377 people and found that, compared to people of European descent, Asians had a significantly higher prevalence of age-related cataract: 30% compared to 3% in people aged under 60 years and 78% compared to 54% in those aged 60 years and over. The age of onset of cataract seems to be earlier in Asians. After adjustment for age, there were no statistically significant ethnic differences in the prevalences of open-angle glaucoma, macular degeneration or diabetic retinopathy.

### Introduction

The major causes of blindness and severe visual handicap among adults in the industrialized world are cataract, macular degeneration, glaucoma and diabetic retinopathy<sup>1,2</sup>, whereas in the developing countries of the Indian sub-continent they are age-related cataract, glaucoma, corneal diseases, infections and malnutrition<sup>3</sup>. The prevalences of most of these diseases differ between the Western World and the Indian sub-continent. The Framingham Eye Study<sup>4-6</sup> reported that the prevalences of age-related cataract, open angle glaucoma and age-related macular degeneration in the age-group of 75 to 85 years were 46%, 7% and 28%, respectively. A survey carried out in Melton Mowbray, England<sup>7</sup> reported similar results. In contrast, a population based study from Punjab<sup>8</sup> found a prevalence of cataract of 88% in people aged over 80 and another from Western UttarPradesh<sup>9</sup> reported a prevalence of 87% in people aged in their 70s.

A large study from North India<sup>10</sup> recorded a prevalence of age-related macular degeneration of only 5% in people aged over 50. This compares to 8.8% in people aged 52-85 years obtained in the Framingham study<sup>4,5</sup>. There may be parallels between these results and evidence from America that suggests that people of European descent have a higher prevalence of macular degeneration than African-Americans, although even this has been disputed<sup>11</sup>.

Apart from a hospital based study from Leicester<sup>12</sup>, very little work has been done to ascertain the incidence or prevalence of eye disease in the Asian Community in Britain. Differences between Asian immigrants and the indigenous population may provide clues to the aetiology of the eye diseases and have important implications for the planning of future Ophthalmic services in Britain.

Leicester is a multi-cultural city with a population of about 300 000 people. Approximately 25% of the city's population are of Asian descent, of whom about half originated from the Indian subcontinent and the other half came from East African countries such as Uganda and Kenya<sup>13</sup>. The East Africans are mostly Gujaraties and Punjabi Sikhs whose forefathers migrated to Africa during British Rule.

We report the prevalences of the major sight threatening conditions (age-related cataract, age-related macular degeneration, open angle glaucoma and diabetic retinopathy) in the British Asians living in Leicester and compare these prevalences with those of an indigenous population of European origin with a similar socio-economic profile. Preliminary results from this survey detailing cataract in the first 157 subjects examined have been published elsewhere<sup>14</sup>. Throughout the paper, British people of Asian descent are referred to as Asians and British people of European descent are referred to as European.

### Subjects and methods

We obtained the cooperation of two neighbouring inner-city general practices. Computerized lists of their patients were made available to us by the Family Practitioner Committee. One of the practices has a total list of about 2500 people, the majority of whom are of Asian origin. The neighbouring practice is approximately the same size but serves mostly people of European origin.

Samples of people aged 40 years and over were randomly chosen from each of the two practices. Separate random samples were drawn from people aged 40-59 years and people aged 60 years and over, in order to increase the representation of the older group in the final sample. The selected names were then checked at the general practitioners' surgeries and those thought still to be resident in Leicester were sent a letter inviting them to attend for examination. Attempts were made to offer alternative appointments for those who found it difficult to attend at the appointed time and second appointments were sent when no reply was obtained. The letters included an explanation in the most common Asian languages.

The people selected were all invited to attend special eye clinics which were set up at the general practitioners' surgeries and the nearby Leicester Royal Infirmary. The subjects who attended the survey clinics were examined by an ophthalmologist and an ophthalmic optician and a questionnaire was completed for each subject.

The ophthalmic examination consisted of visual acuity for near and distance, full refraction, slit-lamp biomicroscopy, Perkins applanation tonometry and fundus examination with direct and binocular indirect ophthalmoscopy after pupillary dilatation. Examination for cataract was carried out by direct ophthalmoscopy after mydriasis and direct and retroillumination with the slit-lamp. In accordance with the definitions used in the Framingham study<sup>5</sup>, age-related cataract was said to be present when the best corrected visual acuity was 6/9 or worse in the affected eye and this was attributable to lens opacities.

For the purpose of this survey the macula was defined as the area of clinically apparent pigmentation surrounding the foveola. Age-related macular degeneration was defined by the presence of degenerative changes together with a best corrected visual acuity of 6/9 or worse. Subjects with a history of secondary or congenital causes of macular disease excluded from the age-related macular degeneration categorization.

The criteria for the diagnosis of diabetic retinopathy were a history of diabetes and the presence of microaneurysms, dot haemorrhages, hard exudates, microvascular abnormalities, or neovascularization. The diagnosis of open angle glaucoma was made if there was glaucomatous cupping of the optic disc (defined as a cup-disc ratio equal to or greater than 0.5 or the presence of notching of the neural rim, or asymmetry of the optic discs), and an intra-ocular pressure above 21 mmHg and an open anterior chamber angle and glaucomatous field defects. Visual fields were examined by Goldmann perimetry using a range of targets between I2e and III4e, but only if the other glaucomatous features were present.

After we had examined all those who were willing to attend we sent a postal questionnaire to the non-responders asking them for basic information on any eye problems. This postal survey was intended as a check on the representativeness of the examined group. Finally, we checked the names of all the people in our sample against the computerized records of the local hospitals in order to ascertain whether any had been seen in an eye clinic. Where they had been, we retrieved their case notes to discover the diagnosis.

The statistical analysis was carried out by the method of logistic regression using general linear interactive modelling<sup>15</sup>. We adjusted for age by using a linear covariate and checked the results against those obtained by using 5 year age bands. No differences were observed and we report the analysis based on linear adjustment for age.

## Results

The response to the survey is set out in Table 1. The lists supplied by the Family Practitioner Committee, contained a total of 2447 names of people aged 40 years and over. Of the original sample of 896 people, 443 had Asian names and 453 had non-Asian names. Asian names are distinctive and reliably distinguishable from those of non-Asians<sup>16</sup>. This breakdown gives a good, but not perfect, indication of the comparative response within the two racial groups.

Table 1. The response at various stages of the survey

	Categorization by name		
	Asians	Non-Asian	Total
FPC list	1075	1372	2447
Random sample	443	453	896
Moved	163	89	252
Died	9	15	24
Invited for examination	271	349	620
Attended	173	204	377
Sent postal questionnaire	98	145	243
Moved	4	4	8
Died	0	4	4
Responded	22	58	80
No contact	72	79	151

FPC=Family Practitioner Committee

When we checked the lists supplied by the Family Practitioner Committee against the records held by the general practitioners, we found that amongst the Asians 163 had moved out of the area and nine had died. In the European group 89 had moved out of the area and 15 had died. The remainder were invited for examination and those who did not respond were sent a postal questionnaire. At this stage we found from returned letters that a further small group had moved out of the area or died.

After these efforts we were still unable to make any contact with 151 (17%) of the original sample and we do not know whether they had moved from the area or simply did not reply to our letters.

In tables describing those who attended for examination we use the actual ethnic group rather than that obtained from the categorization by name. Although we had classified 173 of the subjects who turned up for examination as being Asian on the basis of their names, there were in fact only 165; the difference was mainly due to women who had changed their names on marriage. Eight people of West-Indian origin attended for examination and their data are excluded from the following results.

The percentage prevalence for age-related cataract, pseudophakia or aphakia is given in Table 2. Cataract prevalence was significantly related to age ( $P < 0.001$ ). After adjustment for age, the prevalences did not differ significantly with sex ( $P = 0.94$ ), but did differ markedly between the racial groups ( $P < 0.001$ ).

Table 2. The prevalence of age-related cataract, aphakia or pseudophakia by age and ethnic origin

Racial group	Age	Examined	Prevalence (%)	Standard error (%)
<i>Asians</i>				
	40-49	52	17	5.2
	50-59	37	49	8.2
	60-69	48	69	6.7
	70+	28	93	4.9
<i>Europeans</i>				
	40-49	39	0	—
	50-59	32	6	4.3
	60-69	69	30	5.5
	70+	64	64	6.0

Table 3. The prevalence of age-related macular degeneration

Racial group	Age	Examined	Prevalence (%)	Standard error (%)
<b>Asians</b>				
Women				
	60-69	20	0	—
	70+	13	23	11.7
Men				
	60-69	28	0	—
	70+	15	7	6.4
<b>Europeans</b>				
Women				
	60-69	32	3	3.1
	70+	39	28	7.2
Men				
	60-69	37	3	2.7
	70+	25	16	7.3

Table 4. The prevalences of diabetes and of diabetic retinopathy among people with diabetes

	Asians (165)		Europeans (204)	
	Number	Prevalence (%)	Number	Prevalence (%)
Insulin dependant	4	2.4	4	2.0
Diet-controlled	5	3.0	5	2.5
Tablet-controlled	13	7.9	3	1.5
Total	22	13.3	12	5.9
Diabetic retinopathy	5	23.0*	2	17.0*

\*Prevalence among diabetics

The percentage prevalences for age-related macular degeneration are set out in Table 3. We did not find a single case in either race below the age of 60 years and only two cases under 70. Age was significant ( $P > 0.001$ ), but neither sex ( $P = 0.08$ ) nor racial group ( $P = 0.51$ ) reached conventional significance after allowing for age.

Open angle glaucoma excluding ocular hypertension was only found in seven people all but one of whom were already being treated. Sex ( $P = 0.73$ ) and ethnicity ( $P = 0.20$ ) were not significant after the adjustment for age ( $P = 0.02$ ). The prevalence of diabetes and diabetic retinopathy are set out in the Table 4. All of the diabetic retinopathy was of the background type and had previously been detected at a hospital eye clinic.

The responses to the postal questionnaire showed a remarkable similarity to the results obtained at examination. Asked whether they had seen an optician before, the people seen at examination replied: never 6%; in the last year 31%; over a year ago 63%. The postal group replied in the proportions 10%, 31%, 59% ( $\chi^2$  test  $P = 0.43$ ). In the examined group 10% had known diabetes compared to 14% of the postal group ( $P = 0.45$ ) and 19% of those examined said that they had been told that they had cataract by a doctor compared to 15% of the postal group

( $P = 0.34$ ). These effects remained non-significant when adjusted for age, sex and ethnic origin.

The hospital records were used to compare the examined group and the postal questionnaire group combined with the non-contacts. These results have been presented elsewhere<sup>15</sup>, but briefly they show that the pattern of response varied between the two ethnic groups. Notably we found that the chance of getting a response was increased if the subject had had a previous contact with the local hospital service, especially if they had had a previous appointment at the eye clinics. This effect was stronger in the Asian community than in the European.

## Discussion

The Family Practitioner Committee's lists which we used were not completely up to date and as a result we found that overall 276 (31%) had already moved out of the area or died when we checked them against the general practitioners' lists. This probably underestimates the deficiency as some people who could not be contacted would certainly have moved or died. The relatively poor quality of the original lists is not surprising in the light of previous research. In the borough of Hackney in London only 35% of people aged over 85 who were identified from family practitioner committee lists were traceable at the same address<sup>17</sup>. However, these were the only computerized lists available to us that gave information on age, sex and address.

The higher prevalence of age-related cataract in the Asians has also been found in other population based studies from India<sup>8,9</sup> and with the hospital based study in Leicester<sup>12</sup>. The higher prevalence of cataract in the Asian group below the age of 60 suggests an earlier onset of the disease in the Asians. Overall, the higher prevalence of cataract in Asians living in Britain means that we will find an increasing demand for cataract surgery in British cities with large Asian communities. The average age of these communities is at present much less than that of the indigenous population and we will see an increasing proportion of elderly Asians over the next few decades. It must remain an open question whether the ethnic differences in the prevalence of cataract will be continued through into generations who have never lived outside Britain.

Age-related macular degeneration is thought by some to be rarer among coloured races<sup>11</sup>. Our own results do not demonstrate a racial difference in prevalence rates, but as we were sampling people aged 40 years and over, and macular degeneration is rare before 60 years, our numbers of cases are somewhat small. The overall level of aged-related macular degeneration is similar to that found in the Framingham study which recorded 28% prevalence in people aged 75-85. The trend that we do observe would weakly support the idea that Asians have less macular degeneration.

It is well known that diabetes is more common in Asians. This has been shown for Asians in Leicestershire<sup>19</sup> and in other British Asian communities<sup>20</sup>. Our findings are consistent with this, however, a population based study is not the best way to investigate eye disease in this group and we can say little about the extent of diabetic retinopathy, other than that it was not common and that which we found was all of the background type, perhaps reflecting the good standards of medical care available locally.

The postal survey of the non-responders does not give reliable information on the extent of eye disease but it does suggest that the non-responders are very similar to those who turned up for examination and strengthens our belief in the accuracy of our prevalence estimates. The checks that we performed using the local hospital records suggest that we may be making a slight overestimate of the extent of disease in the Asian community. Though even this effect is comfortingly small and may in part merely be a reflection of greater mobility in this group combined with our inability to discover that they have moved. We do not think that non-response has introduced any major bias into our survey.

This is the first community-based ophthalmic survey of the Asian community in Britain and provides useful baseline data for future epidemiological investigations in the Asian Community living in UK. It is important to both the health services and to scientific research that we continue to monitor eye disease in the British Asian Community to see if the patterns of disease change with time.

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#### References

- 1 Sorsby A. *The Incidence and Causes of Blindness in England and Wales 1948-1962*. Reports on public health and medical subjects No 114. London: HMSO, 1966
- 2 Ghafour MI, Foulds WS. Common causes of blindness and visual handicap in the West of Scotland. *Br J Ophthalmol* 1983;**67**:209-13
- 3 Jones BR. Prevention of blindness: What is it all about? *Trans Ophthalmol Soc UK* 1978;**98**:282-6
- 4 National Eye Institute. *The Framingham Eye Study Monograph* Bethesda, Maryland: National Eye Institute, 1979
- 5 Kahn HA, Leibowitz HM, Ganly JP, Kini MM, Colton T, Nickerson RS, *et al*. The Framingham eye study 1: Outline and major prevalence findings. *Am J Epidemiol* 1977;**1016**:117-32
- 6 Kini MM, Leibowitz HM, Colton T, Nickerson RJ, Ganley JP, Dawber TR. Prevalence of age-related cataract, diabetic retinopathy, age-related macular degeneration, and open-angle glaucoma in the Framingham Eye Study. *Am J Ophthalmol* 1978;**85**:28-33
- 7 Gibson JM, Rosenthal AR, Lavey J. A study of the prevalence of the eye diseases in the elderly in an English Community. *Trans Ophthalmol Soc UK* 1985; **104**:196-203
- 8 Chatarjee A, Milton R, Thyle S. Prevalence and aetiology of cataract in Punjab. *Br J Ophthalmol* 1982;**66**:35-42
- 9 Raizada IN, Mathur AN, Narang SK. A study of prevalence and risk factors of age-related cataract in rural areas of Western UP. *Indian J Ophthalmol* 1984; **32**:339-42
- 10 Jain IS, Gupta A, Dhir SP. Age-related macular degeneration in Northern India. *Indian J Ophthalmol* 1984;**32**:343-6
- 11 Ferris FL. Senile macular degeneration: review of epidemiologic features. *Am J Epidemiol* 1983;**118**:132-51
- 12 Thompson JR. The demand incidence of cataract in Asian immigrants to Britain and their descendants. *Br J Ophthalmol* 1989;**73**:950-4
- 13 Working group for the survey of Leicester. *Survey of Leicester 1983: Initial Report of the Survey*. Leicester: Leicester City Council and Leicestershire County Council, 1985
- 14 Das BN, Thompson JR, Patel R, Rosenthal AR. The prevalence of age related cataract in the Asian community in Leicester: a community based study. *Eye* 1990;**4**:723-6
- 15 Baker RJ, Nelder JA. *General Linear Interactive Modelling [GLIM]*, release 3.77. Oxford: Numerical Algorithms Group, 1987
- 16 Nicoll A, Bassett K, Ulijaszek JS. What's in a name? Accuracy of using surnames and forenames in ascribing Asian ethnic identity in English populations. *J Epidemiol Community Health* 1986;**40**:364-8
- 17 Thompson JR, Das BN, Rosenthal AR. Community surveys of eye disease: who responds? *Invest Vision Ophthalmol* 1992;**33**:862
- 18 Bowling A, Hart D, Silman A. Accuracy of electoral registers and family practitioner committee lists for population studies of the very elderly. *J Epidemiol Community Health* 1989;**43**:391-4
- 19 Samant A, Burden AC, Bent B. Comparative prevalence on non-insulin-dependent diabetes in Asian and White European adults. *Diabetes Res Clin Pract* 1987;**4**:1-6
- 20 Mather HM, Keen H. The Southall diabetes survey. *BMJ* 1985;**291**:1081-3

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