

Motor neuron disease and multiple sclerosis among immigrants to England from the Indian subcontinent, the Caribbean, and East and West Africa

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Abstract

The mortality from motor neuron disease (MND) and multiple sclerosis (MS) was studied among immigrants to England and Wales from the Indian subcontinent, the Caribbean, and East and West Africa during the 10 years 1979-88. The MND mortality among ethnic Asian males was only half and for females one fifth of that expected at English rates. MND mortality in Caribbean immigrants was somewhat lower than expected. White immigrants from the Indian subcontinent had the expected MND mortality. MS mortality was low among Asian, West Indian, and African immigrants. This study is evidence that MND mortality is not the same in all ethnic groups.

(*J Neurol Neurosurg Psychiatry* 1993;56:454-457)

It has already been established that multiple sclerosis (MS) is uncommon among ethnic Asian immigrants and is also uncommon, but less so, among immigrants from the West Indies.^{1,2} Motor neuron disease (MND) was previously considered to be equally distributed throughout the world except for Guam and the Kii Peninsula. When we used MND as a control disease in a study of MS we reported that "MND may be less common or less commonly diagnosed among Indians and Pakistanis than among Europeans."²

Large scale immigration from the new Commonwealth (NC) countries to England and Wales began in the 1950s. These NC immigrants came from the NC Asian countries—mostly from the Indian subcontinent—the NC Caribbean countries, the West Indies, and NC Europe—Cyprus, Malta, Gozo, and Gibraltar. Table 1 shows the increase in these populations in the 1961, 1971, and 1981 censuses. It also shows the immigrant population of those born in the Indian subcontinent at the 1981 census by country of birth. The immigrants born in NC Africa have been divided into those born in NC East Africa—most ethnic Asians—and those born in the remainder of NC Africa. Because MND is usually a disease of older age, the populations by sex over the age of 45 years in 1981 is also shown.

We have now studied MND mortality and morbidity among the NC immigrants from the Indian subcontinent—Indian, Pakistani, Bangladeshi, and European,—immigrants from the Caribbean (West Indians), and from east and west Africa. For comparison, we have studied the mortality and morbidity from multiple sclerosis (MS) among the same immigrant groups. Neurologists would equally be able to diagnose both diseases.

Method

The Office of Population Censuses and Surveys traced and provided copies of the death certificates for all deaths in England

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Received
26 September 1991
and in revised form
6 August 1992.
Accepted 28 August 1992

Table 1 Immigrants to England and Wales from the Indian subcontinent, new Commonwealth (NC) America (the Caribbean), and NC African countries

Census	Indian subcontinent			NC America (Caribbean)			NC African countries		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
1961	91 564	76 608	168 172	96 070	76 309	172 379	25 860	16 939	42 799
1971	267 850	181 145	448 995	151 495	150 990	302 485	86 975	71 280	158 255
1981	329 760	282 627	612 387	143 709	149 923	293 632	137 379	122 398	259 777
	<i>India</i>						<i>East Africa</i>		
1981	194 448	188 329	382 777				101 200	91 589	192 789
	<i>Pakistan</i>						<i>Remainder NC Africa</i>		
1981	103 311	78 428	181 739				36 179	30 809	66 988
	<i>Bangladesh</i>								
1981	32 001	15 870	47 871						
1981 Aged 45 +	107 264	64 264	174 876	64 448	52 590	117 038	13 275	9 738	23 033

and Wales coded for MND (ICD 335.2) or MS (ICD 340) among immigrants from the Indian subcontinent, the Caribbean, and NC east and west Africa, whether of European or non-European ethnic origin, for the 10 years 1979–88. Anglo-Indians with European names were included among the Europeans. The last census of population which included ethnic groups among the immigrant population, was in 1971,³ but we obtained the labour force 1% sample surveys of population in England and Wales by immigrant and ethnic group and by sex and age group, for 1985, 1986, 1987, and took the mean for these three years.⁴ The country of birth populations, which did not include ethnic groups, was obtained from the census in 1981.⁵

The records of patients diagnosed as having MND or MS have been studied in the hospitals of Greater London and the West Midlands since 1972 in order to trace the patients who were born in the Indian subcontinent, east or west Africa, or the Caribbean.^{1,2,6} Most of these hospitals had a diagnostic index, and a diagnostic index for the diseases was also obtained from the hospital activity analysis (HAA) of the relevant health boards. The name of the patient also helped in tracing ethnic Asians and Africans. The majority of these immigrants to England has settled in Greater London or the West Midlands and in the present study they are included during the 10 year period 1979–88 whatever their place of residence. Place of birth was generally mentioned in the hospital records.

The expected number of deaths for MND and MS at England and Wales rates, age, and sex standardised in each ethnic group, were calculated separately from the labour force survey for the three years 1985, 1986, and 1987 and then averaged (table 2). There is very little variation in the expected numbers between the years except among black immigrants from Africa where the number of the immigrants is small.

Results are expressed as standardised mortality ratios (SMR), with rates for England and Wales taken as standard. Confidence

limits for SMRs were based on the exact method using the Poisson distribution. Statistical significance of an SMR was inferred if the relevant confidence limit (95% for $p < 0.05$; 99% for $p < 0.01$) did not include the null value of 100.⁷

Results

MOTOR NEURON DISEASE

During the 10 years, 1979–88, there were 51 deaths coded for MND among immigrants born in the Indian subcontinent. Twenty seven had British or Irish names and are considered to have had European ancestors, and 24 had Asian names. For those with European names there were no significant differences between the number of deaths, 27, and the expected number, 24. There was also no significant difference when males and females are taken separately. There were 21 men and three women with Asian names and the SMR based on the England and Wales mortality was 37.6% (95% confidence limit) (CL) 24.1–56.0% (table 2). The difference is also significant at 99% CL (20.8–62.3%) both for men (25.0–81.1%) and for women (1.7–56.3%). When the Asian MND deaths among those born in the NC east African countries are added, there were 24 male deaths compared with 49.3 expected and four female deaths compared with 21.7 expected. Male Asian immigrants had approximately half and female immigrants one fifth of the reported England and Wales MND mortality.

Thirty seven deaths were reported as due to MND among those born in the Caribbean and the expected number was 50.3 (95% CL 51.8–101.4). There were therefore fewer deaths than expected. The difference was just short of being significant at the 5% level (χ^2 3.52). A further three West Indians who had MND did not have the diagnosis on the death certificate. These three had been found during the search of hospital records.

Twenty four ethnic Asian (21 male and three female) MND patients from the Indian subcontinent and the four from east Africa died during the 10 years 1979–88 with a

Table 2 Deaths certified as due to MND and MS, 1979–88, among immigrants to England and Wales from the Indian subcontinent, the new Commonwealth countries of Africa, and from the Caribbean

Birthplace	Actual Deaths 1979–88			Expected at England and Wales rates 1985–87 averaged		
	Male	Female	Total	Male	Female	Total
<i>Motor neuron disease</i>						
Indian subcontinent:						
European	13	14	27	12.3	11.7	24.0
Asian	21	3	24	44.3	19.5	63.8
NC east Africa:						
European		1	1	0.8	0.8	1.6
Asian	3	1	4	5.0	2.2	7.2
Remainder NC Africa:						
African	1	1	2	2.2	0.4	2.6
NC Caribbean: (West Indians)						
	22	15	37	33.1	17.2	50.3
<i>Multiple sclerosis</i>						
Indian subcontinent:						
European	8	10	18	6.8	12.8	19.6
Asian	2	4	6	37.0	44.9	81.9
NC east Africa:						
European		1	1	0.8	1.9	2.7
Asian	1		1	5.2	7.1	12.3
NC Caribbean: (West Indians)						
	5	7	12	23.9	35.3	59.2

Table 3 MND among ethnic Asian and Caribbean immigrants. England and Wales 1979–88, by age group

Age	MND in ethnic Asians born in the Indian subcontinent					MND in those born in the Caribbean			
	MND deaths 1979–88					MND deaths 1979–88			
	Born Indian subcontinent	Born east Africa	Death not coded MND	Alive* Dec '88	Total	MND deaths 1979–88	Deaths not coded MND	Alive* Dec '88	Total
15–24				1†	1				
25–34	1			2	3				
35–44	3			4	7				
45–54	7		1	3	11	14	1		15
55–64	7	2		5	14	18	2	1	21
65–74	5	2	2		9	3		1	4
75 +	1				1	2			2
Total	24	4	3	15	46	37	3	2	42

*Hospitalised in Greater London and the West Midlands.

†This patient probably had a hereditary form of anterior horn cell disease.

diagnosis of MND as the primary cause of death. A further 15 ethnic Asians were still alive in December 1988, 12 born in the Indian subcontinent and three born in east Africa. Records of three additional ethnic Asians were found who had died between 1979–88, but MND had not been given as a major cause of death on the death certificate. Of those 18 patients (15 living in December 1988 and three dead), 15 were men and three were women, confirming the marked male preponderance found among the ethnic Asians who had MND. The age distribution of these patients with a hospital diagnosis of MND is shown in table 3. Eleven of the Asian MND patients were under the age of 45. Thirty two of the 46 MND patients (table 3) were Indian, 10 Pakistani, and four Bangladeshi. There are about three times more Indians in the older age groups of immigrants than Pakistanis and there is no significant difference between the mortality from MND in the three groups; Indian, Pakistani, and Bangladeshi.

There were two MND deaths in Africans from the remainder of NC Africa and 2.6 is the expected number. The number of these immigrants in the age groups where MND occurs is still too small to make valid conclusions.

MULTIPLE SCLEROSIS

There were 24 deaths from MS among those born on the Indian subcontinent, of whom 18 had European names and six had Asian names and are considered to be ethnic Asians. The number of deaths from MS among those with European names, born in the Indian subcontinent, 18, is not significantly different from the expected number, 19.6 (CL 54.4–145.1) (table 2).

Among the Asians born in the Indian subcontinent there were six MS deaths and the expected number was 82 (99% CL 1.9–19.1; $p < 0.01$), one Asian from east Africa and 12 is the expected number (99% CL 0.0–60.4; $p < 0.01$), confirming that MS is very uncommon among Asians born on the Indian subcontinent or in East Africa.

There were 12 MS deaths among those born in the Caribbean, (West Indians), and 59 was the expected number (99% CL 8.3–40.8; $p < 0.01$). West Indians had, therefore, about one fifth of the MS deaths

expected at England and Wales rates confirming previous studies.^{1,2}

Discussion

Previously it was thought that, with the exception of Guam and the Kii Peninsula, the prevalence of motor neuron disease was similar throughout the world.⁸ This seems to be unlikely given the diversity of environmental and genetic factors in different populations.⁹ It appears unlikely that MND would not be diagnosed among Asians in England as the disease progresses towards death. A number of reports have shown that, except for mental illness, Asians consult their general practitioners more frequently than do native Britons.^{10–13} Ethnic differences were greatest in the age range 45–64, when consultation rates in people of Pakistani, Indian, and West Indian origin were much higher than in white people, and they more frequently request consultant opinion.¹³ The lower MND mortality in ethnic Asians from the Indian subcontinent is also confirmed by finding less than the expected number of patients among the hospital records in Greater London and the West Midlands.

In India, MND often occurs at a younger age than elsewhere and a marked male predominance has been noted.^{14–17} In a study in south India, the male/female ratio was 6:1,¹⁸ the same ratio which we found among Asian immigrants in England. The present study confirms therefore the low MND prevalence found in women compared with men, reported from India. In southern India an MND syndrome, with younger age of onset, deafness, and a more benign course, known as Madras pattern MND has been described.¹⁹ No patients with this syndrome were found in the present study.

That mortality from MND varies from country to country, is also shown by the lower MND mortality among white South Africans, who have only half the mortality seen in England and Wales, unlike people in Australia and New Zealand, where the MND mortality is now higher than in England and Wales. (Dean and Elian, in preparation) A low mortality from MND (amyotrophic lateral sclerosis) has also been reported in Mexico.²⁰

Possible sources of bias that could occur are that ethnic Asians took European names but there was no evidence of this from studying the hospital records of patients; some Asians, when they became too weak and ill, may have returned to their country of origin but this would not have been to their advantage and there is no evidence that they did. The Labour Force Survey might have underestimated the number of Asian immigrants but this, if it happened, would tend to increase the difference between the observed and expected MND in Asians.

Multiple sclerosis is known to be very uncommon among ethnic Asians,^{1,2} and the present findings of a low MS mortality among Asians confirms this. In contrast, recent studies have shown that the United Kingdom-born children of Asian and West Indian immigrants to England have, in the ages available for study, 15–34 years, the same high MS prevalence as occurs in the general United Kingdom population.^{6,21} It is too early to ascertain if this is also true of MND in United Kingdom-born Asians, as there are as yet too few who have reached the age when MND occurs. White immigrants born in the Indian subcontinent have the same MND, and MS, mortality as the general population of England and Wales. Being born in India per se does not protect against developing either disease. Perhaps this is because white children born in India were generally educated in Europe, while white children born in South Africa, where MS and MND are less prevalent than in England, were generally educated in South Africa.

Possible environmental factors include: poor home hygiene increasing the likelihood of infancy infections that leave lifelong immunity; or an infective or toxic factor present or more widespread in developed countries.

The lower MND mortality occurring in Asian immigrants to England could be due to genetic or environmental factors or to a combination of both. The possibility has also to be considered that for some reason the diagnosis of MND is overlooked among a set group of immigrants, or not mentioned on the death certificate, although this would have appeared to be unlikely from our study and follow up of the hospital records. Genetic factors are known to be important in some families for both MS and MND.^{22,23,24} Environmental factors are also involved as suggested by the higher MND prevalence in men than in women, especially in social class III and the much lower mortality from MND among white South Africans, who are of northern European genetic stock. The relative importance of inheritance and environment will be clarified in further studies, especially

on the background history of those who do develop the disease.

We would like to thank Mr Selwyn Hughes and Ms Nirupa Dattani of the Medical Statistics Division and Mr John Haskey of the Social Statistics Division of the Office of Population Censuses and Surveys, St Catherine's House, London, for their enthusiastic help with the study. We also thank the staff of the records departments of the London and West Midlands Hospitals, for their help in tracing patients' records. Dr Leslie Daly helped us with the statistical analysis. Ms Hilda McLoughlin and Ms Maureen Moloney assisted us with the tables and the preparation of the report.

This study was supported by the Motor Neuron Disease Association of Great Britain.

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