Neurological disorders in the elderly at home

G. A. BROE, A. J. AKHTAR, G. R. ANDREWS, F. I. CAIRD,
ANNE J. J. GILMORE, AND W. J. McLENNAN

From the Department of Geriatric Medicine, University of Glasgow, Glasgow

SYNOPSIS Eight hundred and eight subjects participated in three surveys of random samples of people aged 65 years or more living in their own homes. Neurological history and examination showed the prevalence of completed stroke to be 73 per 1 000. Eighty-seven subjects per 1 000 gave a history of transient cerebral ischaemic attacks. These prevalence rates were unaffected by age or sex. Senile dementia was diagnosed in 24 subjects per 1 000 under 75 years and 109 per 1 000 over that age. The prevalence of dementia of all types was 43 per 1 000 under, and 140 per 1 000, over 75 years of age. Parkinsonism was diagnosed in 16 subjects per 1 000, and essential tremor in 17 per 1 000. The prevalence of epilepsy was four subjects per 1 000. Other neurological disorders were diagnosed in 36 subjects, and a similar number had neurological abnormalities to which a definite diagnosis could not be given.

Neurological and psychiatric disorders are the most important causes of disability in the elderly (Akhtar *et al.*, 1972). There are several studies of the prevalence of dementia in old people living at home (see Gilmore, 1974), and Parkinsonism and epilepsy have been similarly investigated (Kurland, 1958, 1959; Brewis *et al.*, 1966). However, although all studies of the epidemiology of cerebrovascular disease, which have been reviewed by Kurtzke (1969) and Hutchinson and Acheson (1975), show an exponential increase in incidence and mortality with age, there do not appear to be any studies of prevalence, which is arguably as useful a measure of the 'burden of cerebrovascular disease' in the community (Acheson and Fairbairn, 1970) as either incidence or mortality. Other neurological disorders have been relatively little studied.

The present study sets out to describe the prevalence of neurological disorders in the elderly. It is part of a group of detailed clinical, laboratory, psychological, and social surveys of old people at home.

METHODS

A total of 808 people aged 65 years or more living at home were studied in three surveys (Table 1):

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TABLE 1
AGE AND SEX OF SUBJECTS

	Age (yr)					Age group		Total
	65-9	70-4	75-9	80-4	85+	65-74	75+	
Men	119	83	67	33	16	202	116	318
Women	145	141	113	55	36	286	204	490
Total	264	224	180	88	52	488	320	808

1. A random sample of 200 people living in the town of Kilsyth took part in a detailed clinical, social psychiatric, and nutritional survey (Andrews *et al.*, 1971); the sample was stratified by age to give approximately equal numbers over and under the age of 75 years.

2. A second similarly stratified random sample of 300 subjects was studied in a parallel detailed survey from six general practices in northern Glasgow.

3. A third random sample, not stratified for age, totalling 308 subjects, was studied in Kilsyth.

In all three surveys, the subjects were initially visited by a health visitor or public health nurse attached to the survey teams, and invited to participate. All who agreed were visited at home by a doctor. A detailed medical history was taken and supplemented by reference to general practitioner and hospital records. In the first two surveys, the subjects

TABLE 2
PREVALENCE OF NEUROLOGICAL DISORDERS

Age (yr) and sex	Subjects (no.)	Completed stroke		Senile dementia		Parkinsonism		Essential tremor		Other diagnoses (no.)
		No.	Prevalence per 1 000	No.	Prevalence per 1 000	No.	Prevalence per 1 000	No.	Prevalence per 1 000	
65-74										
M	202	12 (1)	60	5	25	5	25	2	10	11 (1)
F	286	22	77	7	24	3	10	2	7	9
75+										
M	116	11	95	11 (3)	95	0	—	4 (3)	35	8 (1)
F	204	14 (1)	69	24	118	5 (1)	24	6 (3)	29	12 (2)
Total	808	59 (2)	73	47 (3)	58	13 (1)	16	14 (6)	17	40 (4)

Numbers in parentheses are of subjects with two neurological diagnoses.

had a detailed clinical and psychiatric examination by a doctor, carried out either at a clinic or in their own homes. In the third, a neurological, psychiatric, and cardiovascular examination was carried out in the home. Where the neurological diagnosis was in doubt, in the majority of cases the subject was examined by a neurologist.

The neurological abnormalities encountered were divided into two groups:

1. **DEFINITE NEUROLOGICAL DIAGNOSES** These were made when the history and clinical signs allowed the establishment of a diagnosis. Completed stroke was diagnosed when there was a history of the sudden onset of focal cerebral disorder, persisting for longer than 24 hours, and leaving residual physical signs. Additional attention was paid in the third survey to transient ischaemic attacks, this diagnosis being based on the criteria of Marshall (1964). The criteria for the diagnosis of 'senile dementia' closely followed those of Slater and Roth (1969).

2. **DEFINITE NEUROLOGICAL ABNORMALITY** This term was used if physical signs indicating neurological disorder were present, but the clinical history and the signs did not allow a definite diagnosis. Examples include unilateral or bilateral extensor plantar responses, or hyperreflexia, or both together (when the term 'pyramidal signs' was used). In the absence of other physical signs, changes of uncertain significance such as minor asymmetry of reflexes, areflexia, or equivocal plantar responses were ignored.

RESULTS

Table 1 shows the age and sex of the subjects studied. There were 318 men and 490 women;

488 subjects were aged between 65 and 74 years and 320 were over 75 years of age.

A single definite neurological diagnosis was made in 141 subjects, and two diagnoses in a further 16 (Table 2). Completed stroke as defined was diagnosed in 59 subjects. The prevalence in the whole sample was thus 73 per 1 000, with no striking sex difference or change with age. Transient ischaemic attacks were identified in a further 27 of the 308 subjects (87 per 1 000) in the third survey (Table 3). The prevalence was thus of the same order as for completed stroke. Again there were no significant age or sex differences.

TABLE 3
TRANSIENT ISCHAEMIC ATTACKS

	Age (yr)					
	65-74		75+		65+	
	M	F	M	F	M+F	
Total no. of subjects	103	124	34	47	308	
Transient ischaemic attacks						
No.	8	11	4	4	27	
Prevalence per 1 000	78	89	118	85	87	

'Senile dementia' as defined was present in 47 subjects, the prevalence under the age of 75 being 24 per 1 000 and over that age 109 per 1 000. In three subjects, dementia was probably due to both cerebrovascular disease and 'senile

TABLE 4
DEMENTIA

	Age (yr)				
	65-74		75+		65+
	M	F	M	F	
Total no. of subjects	202	286	116	204	808
Total no. with dementia	9	12	15	30	66
Prevalence per 1 000	45	42	129	147	81
Cause of dementia					
'Vascular'	3	4	4	4	15
'Senile'	5	7	11	24	47
Other	1	1	0	2	4
Severity of dementia					
Mild	8	5	9	13	35
Moderate or severe	1	7	6	17	31

dementia', and in one to chronic alcoholism. There were in all 66 subjects with dementia of all types, the prevalence being 43 per 1 000 under the age of 75 years, and 140 per 1 000 over that age (Table 4). 'Senile dementia' accounted for 57% of cases under the age of 75 years, and 77% over that age. Dementia was considered on clinical and simple psychometric grounds to be mild in 35 of the 66, and moderate or severe (more commonly the former) in the remaining 31.

Thirteen subjects suffered from Parkinsonism (16 per 1 000), all of 'idiopathic' type, and 14 from essential or senile tremor (17 per 1 000, Table 2). A number of the subjects with essential tremor gave a history of many years' duration, and some also had a family history.

There were 10 subjects with peripheral nerve lesions: three with ulnar nerve lesions, one with an ulnar and median nerve lesion (resulting from a gun-shot wound in the first world war), and one each of the following: circumflex nerve lesion after a recent fracture of the humerus, a long-standing traumatic brachial plexus injury, a congenital bilateral sixth nerve palsy, and a brachial plexus lesion with a Horner's syndrome, due to a superior pulmonary sulcus tumour.

A variety of other neurological diagnoses were made in 26 subjects. There were four patients with cervical myelopathy, three with grand mal epilepsy, two with post-herpetic neuralgia, and one each with the following: motor neurone disease, multiple sclerosis, trigeminal neuralgia, pituitary tumour, spina

TABLE 5
DEFINITE NEUROLOGICAL ABNORMALITIES

	Age (yr)				
	65-74		75+		65+
	M	F	M	F	
No. with:					
Unilateral extensor plantar	0	1	1	2	4
Unilateral hyperreflexia	1	3	2	0	6
Unilateral pyramidal signs	1	2	2	1	6
Bilateral extensor plantars	1	0	0	3	4
Bilateral pyramidal signs	0	2	2	3	7
Other abnormality*	4	0	0	2	6
Total	7	8	7	11	33

* Proptosis (?endocrine exophthalmos); dysarthria and ataxia (?diagnosis); tremor (?type); quadrantanopia; Horner's syndrome; dysarthria.

bifida with neurological abnormality in one leg, senile chorea, uraemic encephalopathy, post-operative paraparesis, neurofibromatosis, post-traumatic diplopia, congenital optic atrophy, and facial palsy due to birth injury.

There were 33 subjects with definite neurological abnormalities, to which a certain diagnosis could not be given (Table 5). The majority of unilateral pyramidal signs probably resulted from cerebrovascular disease. Some instances of bilateral pyramidal signs, or bilateral extensor plantar responses, may well have been due to cervical myelopathy without characteristic reflex abnormalities in the upper limbs.

DISCUSSION

The subjects seen in the three surveys are thought to be representative of old people living at home in urban Scotland. In each survey between 20 and 30% of those approached refused to participate, a rate similar to that reported in other comparable studies (Hobson and Pemberton, 1955; Milne *et al.*, 1971). Akhtar (1972) has shown that the physical and mental health of those who refused to participate in the first Kilsyth survey was very similar to that of those who agreed, while Milne *et al.* (1971) also found that those who refused and those who agreed to participate in their study resembled each other in respect of many characteristics.

As expected, completed stroke is numerically the most important neurological diagnosis made

in old people, with a prevalence of 73 per 1 000, a figure which does not differ substantially in the two sexes, or increase with age (Table 2). The prevalence would not be increased by more than a quarter, to approximately 90 per 1 000, if all the subjects with 'definite neurological abnormality' and unilateral 'pyramidal signs' were considered to have a completed stroke. In addition, the prevalence of transient ischaemic attacks (87 per 1 000), as established by detailed attention to symptoms in the 308 subjects in the third survey, shows no striking sex difference nor any increase in frequency with age. Over the age of 65 years the total prevalence in the community of cerebrovascular disease manifest either as completed stroke or transient ischaemic attacks, is thus likely to be of the order of 160–180 per 1 000.

The most important cause of dementia in the elderly, especially in women and over the age of 75 years, is shown by Tables 2 and 4 to be 'senile dementia', rather than cerebrovascular disease. Dementia was considered mild in approximately half the subjects, and moderate or severe in the other half. These findings are closely similar to those of Kay *et al.* (1970) in Newcastle, though substantially less than those of Nielsen (1962) in Sweden (Table 6). Differing definitions may well account for the discrepancy.

TABLE 6
PREVALENCE PER 1 000 OF DEMENTIA
IN POPULATION STUDIES OF OLD PEOPLE

Author	65–74 (yr)		M + F	75+ (yr)		M + F
	M	F		M	F	
Nielsen (1962)	84	74	79	430	320	374
Kay <i>et al.</i> (1970)	35	20	26	122	133	130
This study	45	42	43	129	147	140

The prevalence of Parkinsonism in the community has been reported as 4 per 1 000 among people over 60 years of age (Brewis *et al.*, 1966) and as 11 per 1 000 (Kurland, 1958). The higher figure in the present study (16 per 1 000 among those aged over 65 years) was directly established by the clinical examination of old people both with and without the disorder, rather than esti-

mated from hospital or general practitioner records.

It is somewhat surprising to find that essential tremor has a prevalence in the elderly equal to that of Parkinsonism. Larsson and Sjögren (1960) studied a Swedish population in which essential tremor is known to be very common, and found a prevalence of 61 per 1 000 over the age of 65 years, about three times the figure in the present study. The absence of accompanying disability undoubtedly results in a lesser chance of presenting for diagnosis in hospital (Critchley, 1956). Current teaching does not sufficiently stress the vital therapeutic implications of an accurate clinical distinction between these two common conditions (Critchley, 1949; Larsson and Sjögren, 1960).

Though based on only three subjects, the prevalence of epilepsy in the present study (4 per 1 000) is of the same order as that found by the College of General Practitioners (1962) and Brewis *et al.* (1966) (3–4 per 1 000 over the age of 60 years). The lower rate found by Kurland (1959: 1 per 1 000) is derived from five cases.

The frequency of peripheral nerve lesions (12 per 1 000) is perhaps surprising. Most were of long standing and traumatic in origin. The miscellaneous diagnoses encountered are as expected, except perhaps for the low frequency of cervical myelopathy, and the fact that only one subject with multiple sclerosis was seen. The prevalence of cervical myelopathy has possibly been underestimated in this study owing to the difficulty of establishing the diagnosis with certainty without investigations such as myelography. Some of the seven subjects classified as having definite neurological abnormality with bilateral pyramidal signs may have had cervical myelopathy.

It is tempting to attribute the low frequency of multiple sclerosis to the supposition that the majority of cases who survive into old age do so with considerable disability, and are therefore likely to be found in institutional care; this would have excluded them from the present study. However, clinical experience in Glasgow does not suggest that there is any substantial number of patients over the age of 65 years with multiple sclerosis in institutions. The prevalence of multiple sclerosis over the age of 60 years is at most 125 per 100 000 even in high-risk areas

(McAlpine *et al.*, 1972); one case in 800 subjects gives an identical figure.

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Requests for reprints to F.I.C., University Department of Geriatric Medicine, Southern General Hospital, Glasgow G51 4TF.

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