

An epidemiological survey of age-related dementia in an urban area of Beijing

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ABSTRACT – An epidemiological survey of age-related dementia among community residents of an urban of Beijing was conducted in 1986. Initial screening of 1331 subjects aged 60 and above was made using the Mini-Mental State Examination (MMSE) with a cutoff point of 17. All suspected cases of dementia and 5.5% of all others were then given a full clinical examination, with subjects being diagnosed and classified according to DSM-III criteria. The MMSE was found to have satisfactory sensitivity, although scores were significantly correlated with education. Prevalence rates of moderate and severe dementia were 1.28% for those aged 60 and above and 1.82% for those aged 65 and above. Rates for multi-infarct dementia were higher than those for primary degenerative dementia; females had higher rates than males and rates increased sharply with age. All the dementia cases were cared for in their own homes, by relatives. There is a need for increased knowledge and services for elderly people in the community.

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Dementia is a common organic brain syndrome among elderly people. Henderson & Kay (1) have suggested rates for moderate or severe dementia of 4–5% for those aged 65 years and above in developed countries, with rates rising dramatically with age to about 20% for those aged 80 years and over.

In China, the proportion of elderly people in the population is increasing rapidly. This, combined with recent changes in family structure, implies that dementia will become a major public health problem in the near future. There is, however, little information on prevalence rates to aid planning and to allow comparisons with other populations. This study was therefore undertaken between January and March 1986 when 1331 inhabitants aged 60 years and above from Beijing were assessed. The aims of the study were: to develop and test methods that would be

appropriate to the Chinese culture and yet allow comparisons with other international studies; to describe the prevalence of dementia among elderly people in Beijing; and to look at patterns of care of demented elderly people.

Material and methods

Sample selection

The West District of Beijing, an old residential area, formed the sampling frame. All households in the district are registered in residents' committees, 4 of which were chosen as being geographically representative. All households in these 4 residents' committees were included. There were 986 households with a total population of 10,679. Of these, 1331 (12.4%) were aged 60 years or more, while 865 (8.1%) were 65 years or

more. All 1331 individuals aged 60 years or above were contacted for the survey, and 1090 were assessed.

Survey procedure

The survey was conducted in 2 stages. In the first stage, all subjects were interviewed by trained, lay interviewers in their own homes, to obtain basic demographic data and scores on the Mini-Mental State Examination (MMSE) (2) or, in a few cases the Crichton Royal Behavioural Rating Scale (CRBRS) (3). All subjects scoring 17 or less on the MMSE or 2 or less on the CRBRS were regarded as suspected dementia cases. The second stage involved the clinical examination of all suspected dementia cases by psychiatrists and a final diagnosis made according to the operating diagnostic criteria. The full clinical examination was also administered to a random sample of 5.5% of subjects who scored above 17 on the MMSE to assess the accuracy of the screening method.

Instruments

The MMSE (2) was translated into Chinese from English, with each item being discussed with a neuroepidemiologist from the United States, the late Professor B. Schoenberg. The Chinese version was pretested on a sample of 137 subjects who were either in- or outpatients of the Institute of Mental Health or nursing home residents. There were 17 dementia patients, 47 suffering from other mental disorders and 73 normals, with an age range of 50 to 89. There were 77 males and 60 females. The results of this pretest indicated that an MMSE score of 17 or less, out of a total possible score of 30, was appropriate for defining suspected dementia sufferers. Based on this sample, sensitivity was 1.00 and specificity 0.89.

For subjects who could not communicate verbally, the CRBRS (3) was used as a screening instrument. Based on the pretest, a score of 2 or less out of a possible total of 19 in the mental activity section was taken to indicate suspected dementia.

The clinical examination consisted of the Geriatric Mental State Examination (4) with a few modi-

fications for Chinese conditions, and the Dementia Differential Diagnostic Schedule (5), supplied to us by the World Health Organization.

Diagnostic criteria for dementia

Since the focus of the study was on moderate and severe dementia, we modified the DSM-III (6) criteria for dementia to be more restrictive. Criterion A was thus extended to be:

"loss of intellectual ability of sufficient severity to interfere with daily living, social and occupational functioning of a sufficient degree that help is needed on a day-to-day basis either part or all of the time".

A diagnosis of possible dementia was given to subjects who met all the diagnostic criteria for dementia except the more restrictive criterion A above.

A further category of chronic progressive dementia (CPD) was given to subjects with a gradual, progressive decline in intellectual ability but for whom the cause could not be assessed.

Reliability

All interviewers were trained in the use of the instruments prior to the survey. Agreement on MMSE scores was satisfactory (interrater correlation coefficient = 0.998) as was the diagnosis of dementia (kappa = 0.72–1.00).

Results

Response rates

Of the 1331 elderly people included in the sample, 1090, or 81.9%, took part in the interview. Of the 241 nonrespondents, 201 had moved home, 13 had died, 21 did not take part for other reasons, and only 6 refused. There were no significant differences between respondents and nonrespondents with respect to age or sex.

Sociodemographic data

The age and sex composition of the sample is shown in Table 1. There were 585 females and 505 males, more than half of whom were below

Table 1
Distribution of the sample by age and sex

Age (years)	Male		Female		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
60-64	167	33.1	208	35.6	375	34.4
65-69	145	28.7	153	26.2	298	27.3
70-74	109	21.6	124	21.2	233	21.4
75-79	52	10.3	57	9.7	109	10.0
80-84	25	4.9	32	5.5	57	5.2
≥ 85	7	1.4	11	1.9	18	1.7
Total	505	100.0	585	100.0	1090	100.0

Table 2
Partial correlation of MMSE score with each variable, controlling for all other variables in the regression

Variable	Partial correlation coefficient	<i>P</i>
Sex	-0.1427	< 0.01
Age	-0.1676	< 0.01
Education level	0.5188	< 0.01
Widowed vs. non-widowed	-0.0856	< 0.01
Physical mobility	0.2644	< 0.01

age 70 years. There was no significant difference in the age distribution of the two sexes.

Education. Education levels were generally low, especially among very old subjects and women. In all, 33.7% of the sample were illiterate, with illiteracy among women reaching 53.8%.

Occupation. Of those aged 60 years or more, 4.94 were still working at the time of interview, 62.8% had retired and 32.3%, mostly women (96.5%), had never worked. Among the 724 subjects who had been or were economically active, 60.8% were employed as workers or in service industries, 36.2% were professional or administrative workers and 3% were in other employment.

Marital status. Among those aged 65 years and over, 35.1% were widowed. There was a large sex difference, however, with 51.2% of women and 17.1% of men being widowed. There were 63.2% still married and only 1.7% divorced or single.

Family type. Most of the sample (70% of those aged 60 years and above) lived with their

children, 14.7% with their spouse, 10% with others and only 5.7%, mostly women, lived alone. Those living alone had frequent contact with their children; 81% of them met their children at least once a day.

Analysis of MMSE scores

Of the 1090 respondents, 1072 could be assessed with the MMSE. Forty-two subjects had a score of 17 or less and were thus considered cases of suspected dementia. After clinical examination, 6 were diagnosed as having moderate or severe dementia and 4 as potential dementia. Of the remaining 32 subjects, 1 women refused further examination and 31 were non-dementia cases: 1 with mental retardation, 2 with depression and 28 without any mental disorder.

The possible influence of other factors on the MMSE scores was investigated. In a multiple stepwise regression, raw MMSE scores were taken as the dependent variable and the following factors as independent: age; sex (1 = female, 2 = male); education (1 = illiterate, 2 = semiliterate, 3 = primary school, 4 = middle school, 5 = college or above); physical mobility (1 = bedridden, 2 = walks with help, 3 = walks in room, 4 = walks in yard, 5 = walks without problem); marital status (single, married, divorced or separated, widowed, coded as dummy variables). All factors were found to be significant, although the only marital status variable included was widowed vs. not widowed. Table 2 shows the partial correlation coefficients of MMSE scores with each of the independent variables, controlling for all others in the regression. It can be seen that women have lower scores than men, and that scores decrease with age, decreased physical mobility and widowhood. The strongest correlation is with education: the lower the education level, the lower the MMSE score.

Prevalence of dementia

On the basis of the screening of 1072 subjects with the MMSE, followed by a full clinical examination of the 42 subjects with low scores, there were 6 subjects diagnosed as having moderate or severe dementia and 4 as having potential demen-

Table 3
Prevalence of moderate and severe dementia by age and sex

Age group (years)	Males		Females		Total		
	<i>n</i>	Cases	<i>n</i>	Cases	<i>n</i>	Cases	%
60-64	167	0	208	1	375	1	0.3
65-69	145	1	153	2	298	3	1.0
70-74	109	0	124	0	233	0	0.0
75-79	52	1	57	1	109	2	1.8
80-84	25	0	32	5	57	5	8.8
≥ 85	7	1	11	2	18	3	16.7
Total	505	3	585	11	1090	14	1.3

Table 4
Type of dementia by age and sex

Dementia type	Males			Female			Total
	60-74	≥ 75	Total	60-74	≥ 75	Total	
PDD	0	1	1	0	2	2	3
MID	1	0	1	2	5	7	8
PDD+MID	0	1	1	0	0	0	1
CPD	0	0	0	0	1	1	1
Others	0	0	0	1	0	1	1
Total	1	2	3	3	8	11	14

tia. A full clinical examination was also administered to 57 subjects scoring above 17 on the MMSE screen. No dementia cases were identified.

There were 18 subjects who were unable to be screened with the MMSE because of deafness (6 cases), aphasia (5 cases), dementia (4 cases) and 3 others with language difficulties. These subjects were screened with the CRBRS and information from a relative or other informant, followed by full clinical assessment. There were 8 cases of moderate or severe dementia and one of possible dementia.

Thus, out of 1090 total subjects, 14 cases were identified as suffering from moderate or severe dementia and 5 cases as possible dementia. The prevalence rate of moderate and severe dementia was thus 1.3% of those aged 60 years and over and 1.8% for those aged 65 and over. If possible dementia is included, the rate becomes 1.7% for those 60 years and over or 2.2% for the age group 65 and above.

Table 3 shows the breakdown of the dementia cases by age and sex; prevalence increases sharply with age.

Of the 14 demented patients, 3 were cases of primary degenerative dementia (PDD), 8 were

multi-infarct dementia (MID), 1 case was mixed MID and PDD, one case was CPD and one was caused by carbon monoxide poisoning. The breakdown of these cases by sex and age is shown in Table 4.

The social and demographic characteristics of demented and nondemented subjects were also compared. The demented subjects tended to be female (*n.s.*), had lower education levels, did not live on their own, and were more often single, widowed or divorced. There were no differences in the family structure, but the economic levels of their families tended to be lower. Since education level and widowhood are strongly linked with sex and age among elderly people in China, the demented and nondemented were compared while controlling for sex and age. There were then no significant differences in any of the sociodemographic variables.

Discussion

Design and methodology

This survey was designed to estimate the prevalence of dementia in the community using methods that are appropriate to Chinese cultural con-

Table 5
Prevalence rates of dementia in people aged 60 years and over in China (%)

Authors	Area	<i>n</i>	MID	Senile dementia	Total
Kuang & Zhao (13)	Wuhan	7340	0.39*	0.07	0.46
Zhao (14)	12 units	4619	0.32*	0.24	0.56
Chen (15)	Beijing	8740	0.43	0.38	0.81
Current survey	Beijing	1090	0.83	0.37	1.20

* Cerebral arteriosclerotic psychosis was included.

ditions and that also allow international comparisons to be made. The two-stage design appears satisfactory. Suspected dementia cases were screened out using the MMSE or, in rare cases where the MMSE was not appropriate, the CRBRS. A detailed clinical examination of all suspected cases resulted in a final diagnosis according to DSM-III criteria. The overall response rate was very satisfactory (81.9%), and compares well with other studies (7–9). The refusal rate (0.6%) was very low.

The MMSE as a screening instrument

The MMSE has been widely used as a screening instrument among elderly people in developed countries. This survey is the first time that it has been used for a Chinese population. Both the pretest on a clinical sample and the present survey have shown the MMSE to be simple to use and acceptable to the population. Satisfactory levels of sensitivity and specificity were obtained when a cutoff of 17 was adopted to screen out suspected dementia cases, and interrater reliability was high. In the survey, a 5.5% sample of all subjects scoring above 17 on the MMSE were given a full clinical examination. No dementia cases were identified. It would therefore seem to be an appropriate and useful instrument for surveys of dementia in China.

An analysis of MMSE scores among the 1061 nondemented subjects, however, showed a significant correlation with age, educational level and level of physical activity. The correlations with age and education were similar to those found elsewhere (10, 11). It might therefore be

useful to adopt different cutoffs for different levels of education. This could be especially relevant in China, where education levels tend to be lower among elderly people and among women.

Prevalence of dementia

The prevalence rates of moderate and severe dementia among those aged 60 years and above was 1.3% in the current survey, with rates for PDD being 0.37% and MID being 0.83%. These rates are higher than those reported in other Chinese studies (Table 5) and the rate of 0.5% reported in Taiwan in 1953 (12). It must be borne in mind, though, that the methodology and diagnostic criteria were quite different in these other surveys.

The prevalence rate of 1.8% for those aged 65 years and over is lower than that obtained in other surveys of similar design in developed countries, where rates varied from 2.2% to 6.7% (16, 17). This can be largely explained by differing age distributions of the population. For example, the Chinese population has fewer very old people compared with the United States. When the Chinese age-specific rates are applied to the United States population for 1984 (18), a rate of 3.2% is obtained, closer to that of the United States (7, 8). The prevalence rates rise sharply with age, in a similar manner to that reported by other studies both inside and outside of China (7, 19–21). The results provide a satisfactory fit to the model proposed by Jorm et al. (19), which showed that dementia increases exponentially with age, with rates doubling every 5.1 years.

Rates were higher among women than men, especially for MID, but differences were not sig-

nificant on this small number of cases. Some relationships between dementia and education, marital status and living resources were observed, but were confounded with sex and age differences. A further study with larger numbers of cases will be needed to investigate this.

Cases of MID were more frequent than PDD in our survey. Similar findings have been reported in Japan and the USSR. On the other hand, studies in Europe and the United States have tended to find higher rates for PDD than MID (16, 19, 22). The reasons for these differences call for further study.

Care of dementia sufferers

A final purpose of the study was to consider the current patterns of care for dementia sufferers. None of the 1090 subjects included in the sample had been admitted to a hospital or institution because of mental problems or behaviour. All dementia cases lived at home and were cared for by their spouses (5 cases), their children (5 cases) or other relatives (4 cases). The relatives of 4 of the cases had not recognized any mental disorder or sought any help. In no case had a doctor's advice been sought for the problem.

It is thus evident that there is a considerable need for increased services in mental health care for elderly people in Beijing. Equally important is the need for education programmes within the general population, and especially among those living with elderly people. With the rapid aging of the population, these issues are becoming vitally important.

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