Original Article

Mortality of Dementia and Its Major Subtypes in Urban and Rural Communities of Beijing

WEN HongBo, ZHANG ZhenXin[#], HUANG JueBin, DUAN LeiLei, and WANG QingHua

Department of Neurology, Peking Union Medical College Hospital, Chinese Academy of Medical Sciences, Beijing 100730, China

Abstract

Objective To identify the mortality and epidemiological pattern of dementia and its various major subtypes among urban and rural senior residents in Beijing.

Methods Based on Beijing's dementia prevalence survey among residents aged 55 years and above in 1997, respondents were selected by stratified multiple-stage cluster sampling and 12 urban communities and 17 rural village communities were randomly sampled then follow-up in 2001. COX regression was used to analyze relative risks controlling confounding factors on deaths of dementia cases.

Results The mortality of dement patients in the 55-64 age-group was 0.82/100 person-year. The age-standardized mortality of dement cases was 0.90/100 person-year. The mortality in the 65 and above age-group was 1.44/100 person-year, and the age-standardized mortality was 1.56/100 person-year. Among AD cases, the above two mortalities were 0.35/100 and 0.42/100 person-year respectively, and among VaD cases, 0.34/100 and 0.36/100 person-year respectively. For both AD and VaD cases, their mortality increased with age. Region, gender and age were more significant to survival of AD cases.

Conclusion One major subtype of dementia, AD, among elderly urban and rural residents in Beijing, has a different mortality and epidemiological pattern from VaD.

Key words: Dementia; Mortality; Alzheimer's disease; Vascular dementia

Biomed Environ Sci, 2011; 24(5):483-490 doi:10.3967/0895-3988.2011.05.005 ISSN:0895-3988

www.besjournal.com(full text) CN: 11-2816/Q

INTRODUCTION

With socio-economic advances and improvements in people's living standards in China, average life expectancy has also increased, leading to noticeable changes in population age-group distribution. According to the Fifth National Census in 2000, people aged 60 and above accounted for 14.79 % of the Beijing population, marking a beginning of an aging society. Hence, there is greater attention on senior citizens' health and diseases. Dementia has an increasing impact on people's health and living standards, and imposes higher burdens on the individuals, their families and the society at large. Dementia is an important fatality factor among the elderly population, and it seriously dampens their physical and mental health by reducing their life expectancy and quality of life.

An epidemiological study in European and North American countries found that 4.2% to 11.2% of the people aged 65-years and above were affected with dementia[1-4]. ZX Zhang in his study disclosed that 7.3% of the elderly population in Beijing developed dementia[5], at a level similar to the West. In Western countries, dementia has replaced stroke as the number one neurological condition. Among the senior citizens, 0.1% to 7.2% suffer advanced dementia, who need

[#]Correspondence should be addressed to ZHANG ZhenXin, Tel: 86-10-65295095, E-mail: wuzhangzhenxin@ medmail. com.cn

Biographical note of the first author: WEN HongBo, male, born in 1976, Ph.D Candidate, majoring in neurology epidemiology.

Received: December 7, 2010; Accepted: May 26, 2011

nursing care, and 2% to 15% are affected with light and mild dementia, who have to depend on others for compromised quality of life[6-7].

The problem is worsening in Beijing. Further, there are few reports on the mortality of dementia and its subtypes among the Chinese. Thus, this study aims to investigate people aged 55 and above through a randomized survey to specifically analyze the mortality and epidemiological pattern of dementia and its major subtypes in urban and rural areas of Beijing.

MATERIALS AND METHODS

Sampling of Respondents

A dementia prevalence survey was conducted in 1997 among senior citizens in Beijing based on stratified multiple stage cluster sampling. During that survey, districts of Dongcheng, Haidian and Tongzhou, and Shunyi County were selected as first stage clusters. Then, 6 urban sub-districts and 11 rural towns were randomly selected as second stage clusters. Further, 12 urban residential communities and 17 village communities were randomly selected. Finally, 5 743 senior citizens aged 55 and above were recruited[5].

The investigation team was made up of health workers including neurologists, neuro-psychologists and psychiatrists, who were trained to conduct the interview and complete the questionnaires. Each case was initially diagnosed by investigators, based on detailed medical history, physical exam, scores of intelligence test, medical imaging findings, developing trend and other lab tests. Meanwhile, supervisors examined each questionnaire every day (to check whether there were missed items or logical errors), and each diagnosed case was studied and discussed by the whole team. Respondents in question would be revisited on the next day to substantiate the diagnosis. At last, completed questionnaires were submitted to a senior clinical expert for final diagnosis. Those who could not be diagnosed would be further checked in hospital or revisited in six month later to confirm the diagnosis. Diagnosis of dementia was based on Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) issued by the American Psychiatric Association. AD was diagnosed based on criteria of the National Institute of Neurological and Communicative Diseases and Stroke/Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA). VaD was diagnosed based on criteria of National Institute of Neurological Disorders and Stroke and Association Internationale pour la Recherché etl'Enseignement (NINDS-AIREN).

A follow-up survey was conducted in 2001. Three urban residential communities were lost because of the resettlement of the residents. Finally, 5 035 residents were interviewed in 9 urban communities and 17 villages, and a total of 3 885 residents aged 55 and above (at the time of the first visit) were recorded with complete data in this survey.

We focused on verifying their living status, based on death certificates filed with local police bureaus and health offices and through household visits. If the respondents were not encountered on three household visits, they would be entered as visit failure, and the reason and time of visits were recorded. Mortality factors of the general public and people with major subtypes of dementia were determined based on ICD-10 standards[8]. All data were verified to ensure accuracy.

Statistical Analysis

All data were entered by using Foxpro (6.0), and analyzed with SAS (9.1). The accumulated length of time for observation and disease progress was converted into person-years after statistical review. A single factor multiple level analysis was used to calculate the mortality of dementia and its major subtypes, and COX model was employed to calculate relative fatality risk[9] and to control effects from other factors on fatality of dementia. Age-group distribution of the national population in 2 000 was used to calculate the age-standardized mortality of dementia and its major subtypes, with 95% confidence interval.

Among the major factors affecting length of survival of dementia cases, we listed length of survival as a dependent variable, and region, gender, age, education, occupation and marital status as independent variables. Details are as follows:

Region: urban and rural areas as two dummy variables, and urban as the reference

Gender: male and female as two dummy variables, and male as the reference

Age group: younger than 75 and older than 75 as two dummy variables, and younger than 75 as the reference

Education: illiterate, primary school, junior high school, senior high school, college, and advanced education as six dummy variables, and illiterate as the reference

Occupation: workers, farmers, soldiers, government officers, scientists and technicians, businessmen, and housewives as seven dummy variables, and workers as the reference

Marital status: being married and single as two dummy variables, and being married as the reference.

RESULTS

Profile of Respondents

A total of 3 885 senior citizens aged 55 and above (at the time of the first visit) were recruited with complete data from the Beijing dementia prevalence survey among the elderly, including 1 858 from urban areas and 2 027 from rural areas. The surveys from 1997 to 2001 recruited a total of 13 651 person-years. Table 1 shows demographic data of original respondents and respondents at the 2001 follow-up visit.

Table 1. Data of the 2001 Follow-up Visit for Beijing Urban and Rural Respondents Aged 55 and above

		Urban		Rural	
		Original visit	Follow-up visit	Original visit	Follow-up visit
Gender	Male	1 238	873	1 065	923
	Female	1 447	985	1 285	1 104
	χ^2	0.991 5*		0.210 97*	
Age	55-64	1 311	870	1 180	1 004
	65-74	976	698	825	711
	75-84	321	231	306	275
	85-	77	59	39	37
	χ^2	5.627 298*		5.670 66*	
Years of Education Received	<1	462	317	1 306	1 138
	1~6	615	426	814	697
	>6	1 608	1 115	230	192
	χ^2	0.047 7*		1.965 65*	
Total		2 685	1 858	2 350	2 027

Note. *P>0.05.

Mortality of Dementia and Its Major Subtypes

There were 304 cases suffering from various types of dementia among the respondents aged 55 and above. By the 2001 follow-up visit, 112 of them had died, including 48 of AD, 47 of VaD, and 17 of OD. The crude mortality of people aged 55 and above and of people aged 65 and above in Beijing were 0.82/100 person-year and 1.44/100 person-year respectively. When standardized based on 2000 national demographic distribution, the standardized mortality from dementia in these 2 age groups were 0.90/100 and 1.56/100 person-years respectively. Comparing the age-standardized mortality of the above two age-groups, we found that the mortality from major subtype AD was always higher than that from VaD, specifically, at 0.42/100 and 0.36/100 person-year, and 0.72/100 and 0.51/100 person-year respectively.

AD mortality increased rapidly, while VaD mortality rose rather slowly. Women's age-standardized mortality from dementia and AD was higher than that of men. Men's standardized mortality from VaD in 55 and above age-group was higher than that of women, while in the 65 and above age-group, the opposite was true (see Table 2). Due to its complexity in nature,OD was not included in the study.

Table 3 shows the crude mortality, relative risk and attributable risk of dementia and its subtypes based on demographic statistics.

Table 2. Mortality From Dementia and Its Major Subtypes Among People Aged 55 and Above in Urban and Rural Beijing (/100 person-years)

Age	Male			Female			Total		
	Deaths	Observed Person-year	Mortality	Deaths	Observed Person-year	Mortality	Deaths	Observed Person-year	Mortality
Dementia									
55-64	10	3 083	0.32	7	3 953	0.17	17	7 036	0.24
65-74	18	2 445	0.73	18	2429	0.74	36	4 874	0.73
75-84	16	657	2.43	20	849	2.35	36	1 506	2.39
85-	9	79	11.39	14	156	8.97	23	235	9.78
Total	53	6 264	0.84	59	7 387	0.79	112	1 3651	0.82
Standardized Mortality, and 95% CI		0.87 (0.65~1.14)			0.93 (0.71~1.20)			0.90 (0.73~1.08)	
Mortality among Group ⩾65		1.35（1.48*）			1.51（1.64*）			1.44（1.56*）	
AD									
55-64	0	3 083	0	0	3 953	0	0	7 036	0
65-74	7	2445	0.28	3	2 429	0.12	10	4 874	0.21
75-84	6	657	0.91	11	849	1.29	17	1506	1.12
85-	8	79	10.12	13	156	8.33	21	235	8.93
Total	21	6 264	0.33	27	7 387	0.36	48	13 651	0.35
Standardized Mortality, and 95% CI		0.36 (0.23~0.57)			0.46 (0.30~0.67)			0.42 (0.31~0.56)	
Mortality among Group⩾65		0.66（0.75*）			0.79（0.89*）			0.72（0.83*）	

(Continued)

Age	Male			Female			Total		
	Deaths	Observed Person-year	Mortality	Deaths	Observed Person-year	Mortality	Deaths	Observed Person-year	Mortality
VaD									
55-64	9	3 083	0.29	4	3 953	0.10	13	7 036	0.18
65-74	8	2 445	0.32	11	2 429	0.45	19	4 874	0.38
75-84	6	657	0.91	6	849	0.71	12	1 506	0.79
85-	1	79	1.26	2	156	1.28	3	235	1.27
Total	24	6 264	0.38	23	7 387	0.31	47	13 651	0.34
Standardized Mortality, and 95% CI		0.39 (0.25~0.59)			0.34 (0.22~0.51)			0.36 (0.26~0.48)	
Mortality among Group ⩾65		0.47 (0.49*)			0.55 (0.57*)			0.51 (0.53*)	

Note. *Marks standardized mortality among group aged 65 and above, adjusted for 2000 national demographic age distribution.

Mortality rates of dementia and its various subtypes had statistical significance in relation to age, education, residential area and marital status. Higher education, living in urban areas and married status were positive factors for a lower mortality rate. In the AD group, cases of dementia with 1 to 6 years of schooling had a relative risk of 0.29 (95% CI: 0.21-0.39) in comparison with those with less than 1 year of schooling, and cases with more than 6 years of schooling showed relative risk of 0.23 (95% CI: 0.16-0.32) in comparison with those with less than 1 year of schooling. Relative risk of living in rural areas was 1.62 (95% CI: 1.22-2.13), and unmarried men or women had a relative risk of 5.44 (95% CI: 3.29-8.97). The VaD group showed a similar pattern as the AD group.

Table 3. Mortality From Dementia and Its Major Subtypes Among People Aged 55 and Above in Urban and Rural Beijing (/100 person-years) ,with RR an AR Values

	AD				VaD				Dementia			
	Deaths	Mortality	RR and 95% CI	AR	Deaths	Mortality	RR and 95% CI	AR	Deaths	Mortality	RR and 95% CI	AR
Gender												
Male	21	0.33	1.00	0.00	24	0.38	1.00	0.00	53	0.84	1.00	0.00
Females	27	0.36	1.09 (1.28,0.93)	0.03	23	0.31	0.82 (0.59,1.14)	-0.07	59	0.79	0.94 (0.62,1.41)	-0.05
χ^2	1.04				1.39				0.09			
Age												
55-64	0	0	1.00	0.00	13	0.18	1.00	0.00	17	0.24	1.00	0.00
65-74	10	0.21	0	0.21	19	0.38	2.11 (2.88,1.54)	0.20	36	0.73	3.04 (2.56,3.60)	0.49
75-84	17	1.12	0	1.12	12	0.79	4.38 (2.35,8.14)	0.61	36	2.39	9.95 (7.01,14.12)	2.15
85-	21	8.93	0	8.93	3	1.27	7.05 (3.11,16.11)	1.09	23	9.78	40.75 (23.14,71.73)	9.54
χ^2	213.33*				21.78*				165.13*			
Years of Education Received												
<1 year	33	0.64	1.00	0.00	26	0.50	1.00	0.00	68	1.29	1.00	0.00
1~6 years	8	0.19	0.29 (0.21,0.39)	-0.45	13	0.32	0.64 (0.53,0.77)	-0.18	26	0.62	0.48 (0.30,0.76)	-0.67
>6 years	7	0.15	0.23 (0.16,0.32)	-0.49	8	0.17	0.34 (0.21,0.53)	-0.33	18	0.41	0.32 (0.15,0.66)	-0.88
χ^2	66.82*				21.95*				9.37*			

(Continued)

	AD				VaD				Dementia			
	Deaths	Mortality	RR and 95% CI	AR	Deaths	Mortality	RR and 95% CI	AR	Deaths	Mortality	RR and 95% CI	AR
Residence												
Urban	16	0.26	1.00	0.00	10	0.16	1.00	0.00	32	0.51	1.00	0.00
Rural	32	0.42	1.62 (1.22,2.13)	0.16	37	0.48	3.00 (0.89,10.1)	0.32	80	1.05	2.06 (1.38,3.03)	0.54
χ^2	11.75*				3.15*				13.41*			
Marital Status												
△Being married	20	0.18	1.00	0.00	35	0.32	1.00	0.00	69	0.62	1.00	0.00
▲Being unmarried	28	0.98	5.44 (3.29,8.97)	0.80	12	0.42	1.31 (0.84,2.02)	0.10	43	1.47	2.37 (1.75,3.19)	0.85
χ^2	43.87*				1.47				32.12*			
Total	48	0.35	——	——	47	0.34	——	——	112	0.82	——	——

Notes. *Marks items $P<0.05$. △Being married means spouse is alive; ▲Being unmarried includes such situations as deceased spouse ,beingsingle, or divorced, but predominantly deceased spouse.

Major Causes of Death among Dementia Cases and Their Sequence

Dementia as a risk factor causing death poses great threat to people's health and life. An analysis of the major causes of death among cases of dementia and its major subtypes has important bearing on its prognosis and treatment. In our follow-up visits, we recorded 547 deaths among all the respondents, including 48 AD, 47 VaD, and 17 OD cases. Causes of deaths for all the respondents and the various dementia subtypes were then classified based on ICD-10, and for cases of deaths without recorded cause of death, they were classified otherwise. We relied on death reports filed with local police stations and local center for disease control and prevention for verification of death causes, and further validated them by household visits. Due to the complex nature of subtypes under OD, we did not include it in the analysis of causes of death. See Figures 1 and 2 for causes of death for urban and rural respondents in general and those suffering from various subtypes of dementia.

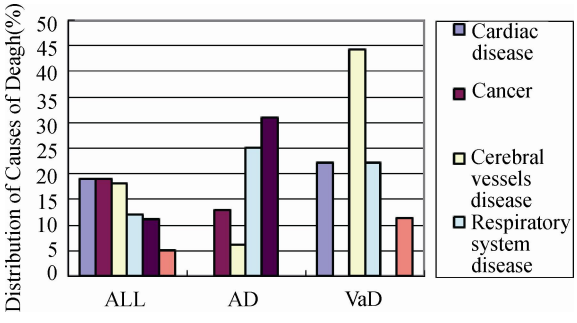

Figure 1. Distribution of causes of death in urban areas.

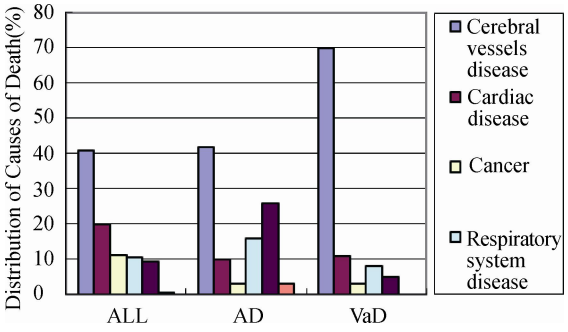

Figure 2. Distribution of causes of death in rural areas.

As shown in Figures 1 and 2, the top six causes of death among urban respondents in general were cardiovascular disease, cancer, cerebral vascular disease, respiratory system disease, senility, and diabetes mellitus. In rural areas, the top six causes of death were cerebral vascular disease, cardiovascular disease, cancer, respiratory system disease, senility, and diabetes mellitus. Also, the sequences of causes of death among major subtypes of dementia and among the respondents in general were different. In cities, the major causes of deaths among AD cases were senility, respiratory diseases and cerebral- and cardiovascular diseases, while in rural areas, they were cerebral vascular disease, senility, respiratory diseases, and cardiovascular diseases. In the case of VaD, the causes of death in both cities and rural villages were cerebral vascular diseases, cardiovascular disease, and respiratory diseases.

Factors Affecting Length of Survival among Dement Cases

In further studying the various demographic

statistical factors for the mortalities of dementia, we found that the length of survival of dement cases were related to a number of factors. In order to study the main factors affecting the length of survival without the impact of compounding factors, we used length of survival as a dependent variable, and region, gender, age, education, occupation, and marital status as independent variables. We introduced the factors into COX regression (see Table 4 for significant factors).

Table 4. Results From Cox Regression - AD Cases RR(98% CI)

Variables	Parameters	Standard Variance	Wald Value	*P* value	RR	RR (95% CI)
Region	0.93866	0.31784	8.7217	0.0031	2.557	(1.37,4.76)
Gender	-0.63522	0.31596	4.0419	0.0444	0.530	(0.28,0.98)
Age	1.42408	0.39540	12.9720	0.0003	4.154	(1.91,9.02)

***Note*.** The Cox regression formula is h(t,Z)=h0(t) exp (0.93866 Region+ -0.63522 gender +1.42408 Age).

Among the factors affecting the length of survival of AD cases, region, gender and age were more significant (α=0.05). It could be concluded that region, gender and age were the risk factors affecting the length of survival of AD cases, at significant levels of 2.557, 0.530, and 4.154 respectively. Risks of death for rural AD cases were 2.557 times higher than those for urban AD cases. Risks of death for female AD cases were 0.530 times higher than those for male AD cases. With the advance in age of AD cases, the risks of death increased accordingly. For example, the risks of death in the AD cases aged above 75 were 4.154 times higher than those aged below 75.

In the analysis of factors affecting the length of survival of VaD cases, all the above variables were not significant. Further study is needed to identify factors that significantly affect the length of survival of VaD cases.

DISCUSSIONS

This population-based study aims to investigate prognosis and outcome of cases of dementia and its major subtypes among the elderly population in general, and to determine the risks and epidemiological patterns. By comparing demographic features and clinical manifestations of dementia cases, we can obtain their death patterns and the major subtypes.

This study also shows that region, age and types of dementia are the major risk factors that affect the length of survival of dementia cases. The mortality among urban cases is lower than that among rural ones. With the advance in age, risks of death from dementia increase. Length of survival of AD cases is affected by age, educational background and marital status. The dement cases with a younger age, higher education and being married live longer, regardless of their age group. Length of survival of VaD cases are affected by region and age, regardless of their gender, educational background and marital status.

Previous studies on survival rates in the elderly relied on death certificates. Due to diagnostic complications, these studies identified that mortality rates of the elderly were low. In 1986, Chemdra[10] et al reported that the mortality rate among dementia cases aged above 85 was 0.98/1 000 person year, and US CDC in Atlanta reported that the mortality rate among people aged 80 and above was 1.1/1 000 person year[11]. In community-based studies, Swedish scholars[12] surveyed 989 people aged 84.3±4.3 who received higher education. During the first three years, 20% of them developed dementia (about 199 persons). Five years later, 70% of the dement cases died while only 35% of normal people or those free from dementia died. Mortality rates were 2.4/1 000 and 1.9/1 000 person years for the dementia and AD groups respectively. Bowen et al[13] in their research revealed that the mortality rate was 9.0/1 000 person years. Hong Zhen in Shanghai[14] reported that the mortality rate among dementia cases aged above 55 was 6.06/1 000 person years.

The present study has found that the mortalities of AD and VaD are distributed differently. Among Beijing citizens in both urban and rural areas, the age-standardized mortality of AD cases is higher than that of VaD cases, for example, 0.42/100 person-year for AD cases versus 0.36/100 person-year for VaD cases aged 55 to 65, and 0.72/100 person-year for AD cases versus 0.51/100 person-year for VaD cases aged above 65. Although both mortalities for AD and VaD cases increase with age, the mortality of AD cases shoots up rapidly. Specifically, the mortality among those aged between 75 and 84 is 1.12/100 person-year, and 8.93/100 person-year among those aged above 85. The mortalities reported in our study are higher than those reported by Chandra[10], USCDC in Atlanta[11] and Swedish scholars[12], at a level similar to findings of Bowen[13] and Hong Zhen[14]. As early as 1976, Katzman noted that dementia was one of the main causes of deaths among people aged 75 and above[15]. It is clear that age is a high risk factor causing death among dementia cases and its major subtypes.

With regard to mortality distribution based on gender, women's age-standardized mortality from dementia and AD is higher than men; in the age group of 55 and above, men's age-standardized mortality from VaD is higher than that of women; and in the age group of 65 and above 65, women's age standardized mortality from VaD is higher than men's. In regard with urban and rural differences, the mortality of urban residents with dementia and its major subtypes is lower than that of rural residents. In urban areas, the age-standardized mortality from AD is higher than that from VaD, while in rural areas, the mortality from VaD is higher than that from AD. AD and VaD are two different diseases, sharing some common vascular risks, but AD has a more marked bearing on old people. The high mortality from VaD in rural areas might be attributable to inadequate local medical service.

Among the various international studies, factors that affect survival of dement cases vary considerably. For example, Freels et al[16] found in their research that AD cases at a higher age, with higher education and low Barthel ADL were faced with higher mortality rates. Helmer et al.[17] found that educational background did not have significant relationship with survival of dementia cases.

Our study has found that the mortality of AD cases varies due to educational background; the higher the education, the lower the mortality from AD, regardless of their urban or rural residence. However, this factor was not introduced in the COX model. This may be largely due to the national conditions in China. In this country, the higher education one receives, the higher socio-economic status and income he enjoys, while the opposite is true with less education. In addition, China is a developing country with inadequate health resources and relatively low levels of overall medical service. AD is a progressive illness that causes complete loss of perception, impaired behavior and capability to cope with everyday life, and thus becomes a great burden to the individual, family and the society at large. In the USA, each AD case receives medical care that is worth about US$40 000 on average[16], while in China the figure is about RMB20 000 to 30 000. Such a high expenditure is a heavy burden for families with lower education and income, so AD cases cannot get deserved treatment or care, leading to a high mortality. AD cases and families with higher education, social-economic status and income can bear the cost of reasonable treatment and care, thus making them live longer. Thus, we believe that educational background of the AD cases is not related to the mortality, or slow progress of AD, but the result of socio-economic status and income do play a role. A joint research undertaken by London and Madrid also indicated that mortality rates of the dement cases with varying educational backgrounds were the same, and education seemed unrelated with the progression of AD. The mortality of VaD shows a different picture, regardless of educational background. The major causes of death of VaD cases are cerebral and cardio vascular diseases, which are common to all strata of society with different educational backgrounds. Therefore, we have concluded that education is not related to the mortality of VaD.

As to the causes of death among dement cases, a Swedish study[20] reported that the major causes of death were lung infection and cardiovascular diseases, which were similar to non-dement old aged people. However, among VaD cases, more deaths were caused by cardiovascular diseases, especially heart failure, than among AD cases. The most common cause of death among AD cases is pneumonia. Dementia is an affiliated problem, and never becomes the main cause of death.

A number of researches in Canada have shown that the major causes of death of VaD cases are cardio and cerebral vascular diseases, which are also the causes of death of most AD cases. Among clinically diagnosed AD cases, only 14.3% of their death records show dementia as the primary cause, and 41.8% show dementia as a secondary cause. Among VaD cases, the two percentages are 5.8% and 23.3% respectively. In some countries, dementia is the fourth largest cause of death, after cardiovascular disease, cerebral vascular disease, and malice tumor, seriously compromising the quality of life and life expectancy[22-23].

In our research, the primary causes of death among AD cases are cardio and cerebral vascular diseases, respiratory system infection, and senility (that is, AD itself). Primary causes of death among VaD cases are cerebral vascular disease, cardiovascular disease, and respiratory system infection. These are similar to the findings reported in other parts of the world. The causes of death in our research were based on death reports filed at local police stations and quarantine stations, and were further validated by household visits. Competence of medical diagnosis is directly related with disease diagnosis and identification of causes of death. Since rural residents comprise a large proportion of our study population, the disparity in access to medical services between urban and rural

areas does exert considerable effect, for instance, some rural patients can hardly have access to proper diagnosis and identification of death causes. In addition, there is also quality difference in the quarantine station reports on death causes. They generally record the causes of sudden death of elderly people as cerebral and cardio vascular diseases. Therefore, the differences in determining death causes of the respondents group in our research also underlie the pattern of current medical services in China.

In our research on the mortality and epidemiological pattern focusing on old-age dementia cases in general in China, we have discovered something meaningful. That the mortality of dementia of major subtypes is higher in rural areas than in cities. Considering the limitations, this findings need to be further affirmed in different population in China.

REFERENCES

1. Breitner HC, Wyse BW, Anthony JC, et al. APOE-epsilon4 count predicts age when prevalence of AD increase, then declines: the Cache County study. Neurology, 1999; 55, 321-31.
2. Obadia Y, Rotily M, Degrand-Guillaud A, et al. The PREMAP study: prevalence and risk factors of dementia and clinically diagnosed Alzheimer's disease in Provence, France. Prevalence of Alzheimer's disease in Province. Eur J Epidemio, 1997; 13, 247-53.
3. Bachman DL, Wolf PA, Linn R, et al. Prevalence of dementia and probable senile dementia of the Alzheimer type in the Framingham study. Neurology, 1992; 42, 115-9.
4. Jorm AF, Korten AE, Henderson AS, et al. The prevalence of dementia: A quantitative integration of the literature. Actapsychiatrscand, 1987; 76, 465-79.
5. Zhang ZX, WeiJ, HongX, et al. Is China a low risk area for Dementia? Chin J ClinNeurosci, 2000; 8(suppl), 27-9. (In Chinese)
6. Bennett D. Public health importance of vascular dementia and Alzheimer's disease with cerebrovascular disease. Int J Clin Pract, 2001; 120(suppl), 41-8.
7. Lyketsos CG, Sheppard JM, Rabins PV. Dementia in elderly persons in a general hospital. Am J Psychiatry, 2000; 157, 704-7.
8. World Health Organization. The ICD-10classification of mental and behavioural disorders: clinical descriptions and diagnostic guidelines. Geneva: World Health Organization, 1995; 50-51.
9. COX DR. Regression models and life-table. JR Star Soc B, 1972; 34, 187.
10. Chandra V, Bharucha NE, Shoenberg Bs. Patterns of mortality from types of dementia in the United States, 1971 and 1973-1978. Neurology, 1986; 36, 204-8.
11. Desai MM, Zhang P, Hennessy CH. Surveillance for morbidity and mortality among older adults-United States,1995-1996. MMWR CDC Surveill Summ, 1999; 48, 7-25.
12. Aguero-Torres H, Von Strauss E, Viitanen M, et al. Institutionalization in the elderly：the role of chronic diseases and dementia Cross-sectional and longitudinal data from a population-based study. Clin J Epidemiol, 2001; 54, 795-801.
13. Bowen JD, Malter AD, Sheppard L, et al. Predictors of mortality in patients diagnosed with probable Alzheimer's disease. Neurology, 1996; 47, 433-9.
14. Hong Z, Zhou B, Huang MS, et al. Predictive factors on mortality and survival of elderly dementia in Shanghai. Chin J Epidemiol, 2005; 26, 404-7. (In Chinese)
15. Katzman R. The prevalence and malignancy of Alzheimer disease: a major killer. Arch Neuro, 1976; 33, 217.
16. Freels S, Nyenhuis DL, Gorelick PB. Predictors of survival inAfrican American patients with AD, VaD or stroke withoutdementia. Neurology, 2002; 59, 1146-53.
17. Helmer C, Joly P, Letenneur L, et al. Mortality with dementia：results from a French prospective community-based cohort. Am J Epidemiol, 2001; 154, 642-8.
18. Petersen RC, Stevens JC, Ganguli M, et al. Practice parameter: early detection of dementia: mild cognitive impairment(an evidence-based review).Report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology, 2001; 56, 1133-42.
19. Munoz DG, Ganapathy GR, Eliasziw M, et al. Educational attainment and socioeconomic status of patients with autopsy-confirmed Alzheimer disease. Arch Neurol, 2000; 57, 85-9.
20. Kammoun S, Gold G, Bouras C, et al. Immediate causes of death of demented and non-demented elderly. Acta Neurol Scand, 2000; 176(suppl), 96-9.
21. Gambassi G, Lapane KL, Landi F, et al. Gender differences in the relation between comorbidity and mortality of patients with Alzheimer's disease. Systematic Assessment of Geriatric drug use via Epidemiology (SAGE) Study Group. Neurology, 1999; 53, 508-16.
22. Ostbye T, Hill G, Steenhuis R. Mortality in elderly Canadians with and without dementia: a 5-year follow-up. Neurology, 1999; 53(3), 521-6.
23. Agüero-Torres H, Fratiglioni L, Guo Z, et al. Mortality from dementia in advanced age: a 5-year follow-up study of incident dementia cases. J Clin Epidemiol, 1999; 52(8), 737-43.