Neurol J Southeast Asia 1997; 2 : 129 – 134

REVIEW ARTICLES

Epidemiology of Dementia among the Chinese

Hsiu-Chih LIU MD, *Evelyn Lee TENG PhD

*The Neurological Institute, Veterans General Hospital-Taipei, and Department of Neurology, National Yang-Ming University School of Medicine, Taipei, Taiwan; and *Department of Neurology, University of Southern California School of Medicine, Los Angeles, CA, U.S.A.*

Abstract

Dementia has become a growing medical and social concern because the aging population is increasing rapidly in most countries. The prevalence of dementia among the Chinese >= 65 years in age has been found to be lower (1.8% to 4.6%) than those found in Western countries and Japan. Factors proposed to account for the lower prevalence rates are: the protectiveness of the Chinese family toward their elders, low frequencies of apolipoprotein E4 (4.7 to 7.9%) in Chinese populations, and a high mortality of Chinese dementia subjects. Alzheimer's disease is the most common subtype of dementia found in most of the Chinese community surveys. Risk factors for Alzheimer's disease include old age, female gender, low educational background, and the presence of the apolipoprotein E4 allele.

Key words: Prevalence, dementia, Alzheimer's disease, apolipoprotein E, Chinese

THE PREVALENCE OF DEMENTIA IS LOWER AMONG THE CHINESE THAN AMONG WESTERN POPULATIONS

Dementia is a world-wide medical and social concern because the aging population has been increasing rapidly in most countries. Community survey of dementia among the Chinese can be dated back to 1953 when Lin et al. reported a prevalence rate of 0.6% in a population of 60 years of age and older in Taiwan[1]. Since then, a number of epidemiological studies of dementia in Chinese populations have been conducted in Taiwan,[2-6] Kinmen,[7,8] China,[9,10] and Singapore,[11,12] as shown in Table 1. Prevalence rates found in these surveys ranged from 0.6% to 4.6%. Although a prevalence of 6.3% in Kinmen was reported by Liu HC et al,[7] older age groups were oversampled in this study; after back-calculation to fit the actual age distribution of the community, a lower rate of 2.8% was obtained.[4]

The prevalence of dementia in population ≥65 years in age ranged from 3.0 to 6.7% in Japan,[13,14] and from 3.5% to 14.9% in Europe and the United States.[15-20] Except for the 4.6% rate found by Zhang et al[10] and the 4.4% rate found by Liu CK et al,[6] the Chinese studies have shown lower prevalence rates of dementia (around 2.5%) than those found in studies conducted in Japan and Western studies. One unique feature of the Chinese studies is a high rate of illiteracy in their study populations that ranged from 27% to 73%.[4,6-10] A plausible reason for the higher prevalence rates of dementia obtained by Zhang et al[10] and Liu CK et al[6] is that both studies emphasized neuropsychological test findings in the diagnosis of dementia, and individuals with little or no formal education are likely to perform poorly on conventional cognitive tests.

There have been only two published studies on the incidence of dementia among the Chinese which respectively reported an annual incidence rate of 0.56% for age ≥60[21] and of 1.05% for age ≥65,[22] as shown in Table 3. These rates were slightly lower than the rates found in Western countries.[23,24] Both of the Chinese studies found that the incidence rate increased with aging and were higher among the illiterate.

Three factors may have contributed to the generally lower prevalence rates of dementia found in Chinese populations. One is the protectiveness of the Chinese families towards their elders. In the traditional Chinese culture, most of the elders live with and are taken care of by their children or other younger relatives. They are not expected to perform much

Correspondence to Dr. Hsiu-Chih Liu, Neurological Institute, Veterans General Hospital-Taipei, Taipei, Taiwan. Telephone: 886-2-8757492 Fax: 886-2-8738696 E-mail: hcliu@isc1.vghtpe.gov.tw

TABLE 1: Prevalence of dementia in populations ≥65 years in age among the Chinese studies

Location and Author	Year of survey	Sample size	Response rate (%)	Prevalence (%)	
				Total	Man/Woman
Taiwan					
Lin TY[1]	1946	1113#		0.6	
Lin TY[2]	1961	1607#		0.7	
Lin HN[3]	1982	1023	75	2.7	1.0/4.5
Liu HC[4]	1988	1469	83	2.0	1.8/2.2
Yip PK[5]	1991	1038	89	1.9	1.3/2.9*
Liu CK[6]	1992	1016	85	4.4	3.2/5.8*
Kinmen					
Liu HC[7]	1992	254	67	6.3	2.3/4.7
Liu HC[8]	1993	1736	85	2.5	1.7/3.2
China					
Li G[9]	1986	715	82	1.8	0.9/2.7
Zhang M[10]	1987	3558	76	4.6	2.0/6.6*
Singapore					
Kua EH[11]	1985	612		1.8	1.5/2.1
Kua EH[12]	1990	200		2.5	2.2/2.8

The population sampled was ≥60 years in age
* Statistically significant at the 0.05 level

household chores and usually do not need to travel beyond their immediate neighbourhood or conduct complex social transactions. Their social circle is typically limited to family, close relatives, and long-term friends and neighbours. According to the DSM-III-R criteria,[25] the diagnosis of dementia requires impairments that are severe enough to interfere with work or social activities or relationship with others. Some of the Chinese elders may be forgetful, but that does not interfere with their functioning in protective environments and simple life settings. In addition, until recently, most Chinese regard forgetfulness and other cognitive and behavioural deterioration as part of normal aging. Consequently, mild or moderate cases of dementia may not only be under-diagnosed by professionals, but also be unsuspected by their

TABLE 2: Incidence of dementia among Chinese studies

Location and Author	Year of survey	Sample size	Response rate (%)	Annual Incidence (%)	
				Total	Man/Woman
China					
Li G[21]	1989	825#	76	0.56	0.44/0.66
Taiwan					
Liu CK[22]	1994	2286*	81	1.05	1.1/1.0

The population sampled was ≥60 year in age
* The population sampled was ≥65 years in age.

TABLE 3: Relative rates of the subtypes of dementia in population ≥65 years in age among the Chinese community studies

Location and Author	Year of survey	Number	Subtypes of dementia (%)		
			AD	VsD	Other
Taiwan					
Lin HN[3]	1982	28	96	4	0
Liu HC[4]	1988	31	58	32	10
Liu CK[6]	1992	45	49	24	27
Kinmen					
Liu HC[7]	1992	16	81	6	13
Liu HC[8]	1993	44	80	7	13
China					
Li G[9]	1986	13	23	54	23
Zhang MY [10]	1987	159#	65	27	8
Singapore					
Kua EH[11]	1985	11	64	36	0
Kua EH[12]	1990	5	60	40	0

The population sampled was ≥55 years in age

families. In other words, the same individuals may be diagnosed as being normal or having questionable dementia (a rating of 0 or 0.5 on the Clinical Dementia Rating Scale, or CDR)[26] if they live with their families in a rural Chinese setting, but be diagnosed as having mild or moderate dementia (a rating of 1 or 2 on the CDR) if they live in Western societies without close family support and need to operate modern appliances, drive or take public transportation, shop, make bank transactions, etc., in their daily life.

The second factor for the lower prevalence rates of dementia found among the Chinese may be genetic. A significant association between the apolipoprotein E4 allele (apoE4) and Alzheimer's disease has been found among the Chinese[27,28] as well as among the Caucasians.[29,30] While the frequency of the apoE4 in Caucasian populations was around 16%,[29] the corresponding frequencies found among Chinese populations were much lower, ranging from 4.7 to 7.9%.[27,28,31,32]

The third factor may be the shorter survival of the Chinese dementia patients. The prevalence rate is a product of the incidence rate and survival time. Although the two-year survival rate of the Shanghai study was 76%,[33] the two-year survival rate reported by Liu HC et al was only 32%.[8] The one-year survival rate reported by Liu CK et al was 65%,[22] and the estimated two-year survival rate would be lower. The rates obtained by Liu HC et al[8] and Liu CK et al[22] are lower than the two-year survival rates of 56 to 86% found in community-based studies in Western countries.[34]

SUBTYPES OF DEMENTIA

Two hospital-based studies in Taiwan[35,36] have found more cases of vascular dementia (VsD) than Alzheimer's disease (AD). In contrast, most community surveys,[3,4,6-8,10-12] except that of Li G et al,[9] found higher frequencies of AD than VsD (Table 3). The discrepant findings between the hospital studies and the community surveys are probably due to selective sampling: VsD patients are likely to be hospitalized for their neurological impairments, but many Chinese people tend to regard the symptoms of AD as signs of normal aging and therefore do not seek medical attention. Consequently, AD cases are more likely to be found at home during community surveys.

RISK FACTORS FOR ALZHEIMER'S DISEASE

While increasing age has been found to be a

significant risk factor for dementia in a majority of the community surveys,[4-8,10] female gender[5,6,10] and illiteracy (or low educational background)[4,7,10] have been found to be risk factors in only some of the studies. As shown in Table 1, the prevalence rate of dementia among women was two to three times of that among men in the studies by Yip et al,[5] Liu CK et al[6] and Zhang et al.[10] In these three studies, female gender was an independent risk factor for dementia found with logistic regression analysis. In the studies conducted by Liu HC et al, higher dementia rates for women than for men either were not found[4], or disappeared after controlling for age and education.[7,8]

There were only two case-control studies of risk factors for AD among the Chinese. One was conducted in Beijing by Li G et al,[37] and the other was conducted in Taipei by Wang PN et al.[38] From 70 AD patients and 140 age- and gender-matched controls, Li G et al[37] found that AD had a significant association with a family history of dementia in first-degree relatives, a family history of psychotic disorders in first-degree relatives, and left-handedness or ambidexterity. Comparing 98 AD patients and 98 age- and gender-matched controls, Wang et al[38] found that AD cases had a significant association with the presence of ApoE4 allele and the consumption of water from wells. In the Wang et al study, 98 AD patients and 70 controls had apoE genotyping. The frequency of the ApoE4 allele in the AD patients was 21.4%, which was significantly higher than that of 5.7% among the controls. The odds ratio of carrying at least one ApoE4 allele was 3.93 for AD.

DISCUSSION

Although variations in the details of study methods have prevented precise comparison of findings across all studies, the epidemiological studies of dementia have generally shown similar findings for the Chinese and for Western populations. A notable exception to this general finding is the lower prevalence rates of dementia found among the Chinese than among the Western populations. Education[39] and estrogen use in post-menopausal women[40,41] have been shown to be protective factors for dementia. In general, the use of estrogen after menopause is uncommon among Chinese women. The percentage of illiterate individuals in the Chinese studies was much higher than that in Western studies. These two factors (less estrogen use and higher rates of illiteracy) should have contributed to a higher prevalence of dementia among the Chinese, but it seems that their effects are more than balanced out by the opposing factors of protective environment, lower rates of apoE4, and shorter survival time of the dementia cases. In addition, there might be other yet undetected factors that have contributed to the lower prevalence rates among the Chinese, including other environmental, lifestyle, and diet[42] factors. For example, White et al[43] found that the prevalence of AD among Japanese-American men in Hawaii was higher than that found in Japan and comparable to that among Caucasians; this finding suggests an influence of changed diet, nutrition, environment, or lifestyle on the prevalence of AD.

The obtained prevalence rates of dementia are partly influenced by the diagnostic criteria for dementia, and it is important to keep in mind that the same set of diagnostic criteria may have different "biases" for different cultural setting. Many other factors, including the age composition of the study population and survival time, also influence the obtained rates. To enable more precise comparisons across studies, future efforts should aim at obtaining age-specific incidence rates.

ACKNOWLEDGEMENT

This work was supported in part by National Health Research Institute (grant DOH86-HR-604) and Veterans General Hospital-Taipei (grant V-351).

REFERENCES

1. Lin TY. A study of incidence of mental disorders in Chinese and other cultures. Psychiatry 1953; 16:313-6.
2. Lin TY, Rin H, Yeh EK, et al. Mental disorders in Taiwan fifteen years later: a preliminary report. In: Caudell W, Lin TY, eds: Mental Health Research in Asia and the Pacific. Honolulu: East-West Center Press 1969; 66-91.
3. Lin HN, Tsai MT, Rin H. Psychiatric disorders among old people in a rural area: Hung-Ch'un study. Bull Chin Soc Neurol Psychiatry 1984, Special Issue 1:64-79 (in Chinese).
4. Liu HC, Lin KN, Teng EL, et al. Prevalence and subtypes of dementia in Taiwan: a community survey of 5297 individuals. J Am Geriatr Soc 1995; 43:1-6.
5. Yip PK, Shyu YI, Liu SI, Lee JY, Chou CF, Chen RC. An epidemiological survey of dementia among elderly in an urban district of Taipei. Acta Neurol Sin 1992; 1:347-54.
6. Liu CK, Lin RT, Chen YF, Tai CT, Yen YY, Howng SL. Prevalence of dementia in an urban

area in Taiwan. J Formos Med Assoc 1996; 95:762-8.
7. Liu HC, Chou P, Lin KN, et al. Assessing cognitive abilities and dementia in a predominantly illiterate population of older individuals in Kinmen. Psychol Med 1994: 24:763-70.
8. Liu HC, Fuh JL, Wang SJ, et al. Prevalence and subtypes of dementia in a rural Chinese population. Alzheimer's Disease & Associated Disorders (in press).
9. Li G, Shen YC, Chen CH, Zhao YW, Li SR, Lu M. An epidemiological survey of age-related dementia in an urban area of Beijing. Acta Psychiatr Scand 1989; 79:557-63.
10. Zhang M, Katzman R, Salmon D, et al. The prevalence of dementia and Alzheimer's disease in Shanghai, China: impact of age, gender, and education. Ann Neurol 1990; 27:428-37.
11. Kua EH. The prevalence of dementia in elderly Chinese. Acta Psychiatr Scand 1991; 83:350-2.
12. Kua EH, Ko SM. Prevalence of dementia among elderly Chinese and Malay residents of Singapore. Int Psychogeriatr 1995; 7:439-46.
13. Homma A, Nina R. International views. Research on Alzheimer's disease in Japan. Alzheimer Dis Assoc Disord 1988; 2:366-74.
14. Ueda K, Kawano H, Hasuo Y, et al. Prevalence and etiology of dementia in a Japanese community. Stroke 1992; 23:798-803.
15. Jorm AF, Korten AE, Henderson AS. The prevalence of dementia: a quantitative integration of the literature. Acta Psychiatr Scand 1987; 76:465-79.
16. Kokmen E, Beard CM, Offord KP, et al. Prevalence of medically diagnosed dementia in a defined United States population: Rochester, Minnesota, January 1, 1975. Neurology 1989; 39:773-6.
17. 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.
18. Copeland JRM, Davidson IA, Dewey ME, et al. Alzheimer's disease, other dementia, depression and pseudo-dementia: prevalence, incidence and three-year outcome in Liverpool. Br J Psychiatry 1992; 161:230-9.
19. Prencipe M, Casini AR, Ferretti C, Lattanzio MT, Fiorelli M, Culasso F. Prevalence of dementia in an elderly rural population: effects of age, sex, and education. J Neurol Neurosurg & Psychiatry 1996; 60:628-33.
20. Pi J, Olive JM, Roca J, Masana L. Prevalence of dementia in a semi-rural population of Catalunya, Spain. Neuroepidemiology 1996; 15:33-41.
21. Li G, Shen YC, Chen CH, Zhau YW, Li SR, Lu M. A three-year follow-up study of age-related dementia in an urban area of Beijing. Acta Psychiatr Scand 1991; 83:99-104.
22. Liu CK, Lin RT, Lai CL, Tai CT, Yen YY, Howng SL. Alzheimer's disease and vascular dementia in Taiwan: prevalence and incidence of 2915 elderly community residents. In: Iqbal K, Winblad B, Nishimura T, Takeda M, Wisniewski HM, eds: Alzheimer's disease: biology, diagnosis and therapeutics. John Wiley & Sons, Ltd, 1997; 21-31.
23. Hebert LE, Scherr PA, Beckett LA, et al. Age-specific incidence of Alzheimer's disease in a community population. JAMA 1995; 273:1354-9.
24. Mann AH, Livingston G, Boothby H, Blizard. The Gospel Oak study: the prevalence and incidence of dementia in an inner city are of London. Neuroepidemiology 1992; 11 (suppl 1): 76-9.
25. American Psychiatric Association. Diagnostic and statistical manual of mental disorders; 3rd ed. -- revised. Washington, DC: APA, 1987.
26. Hughes CP, Berg L, Danziger WL, Coben LA, Martin RL. A new clinical scale for the staging of dementia. Br J Psychiatry 1982; 140:566-72.
27. Hong CJ, Liu TY, Liu HC, et al. e4 allele of apolipoprotein E increases risk of Alzheimer's disease in a Chinese population. Neurology 1996; 46:1749-51.
28. Mak YT, Chiu H, Woo J, et al. Apolipoprotein E genotype and Alzheimer's disease in Hong Kong elderly Chinese. Neurology 1996; 46:146-9.
29. Saunders AM, Strittmatter WJ, Schmechel D, et al. Association of apolipoprotein E allele e4 with late-onset familial and sporadic Alzheimer's disease. Neurology 1993; 43:1467-72.
30. Maestre G, Ottman R, Stern Y, et al. Apolipoprotein E and Alzheimer's disease: ethnic variation in genotypic risks. Ann Neurol 1995; 37:254-9.
31. Hallman DM, Boerwinkle E, Saha N, et al. The apolipoprotein E polymorphism: a comparison of allele frequencies and effects in nine populations. Am J Hum Genet 1991; 49:338-49.
32. Kao JT, Hsu WS, Tsai KS. Apolipoprotein phenotyping methodology and population frequency of Taiwan. J Biomed Lab Sci 1994; 6:73-9.
33. Katzman R, Hill LR, Yu ESH, et al. The malignancy of dementia. Predictors of mortality in clinically diagnosed dementia in a population survey of Shanghai, China. Arch Neurol 1994; 51:1220-5.
34. van Dijjk PTM, Dippel DWJ, Habbema JDF. Survival of patients with dementia. J Am Geriatr Soc 1991; 39:603-10.
35. Liu HC, Tsou HK, Lin KN, et al. Evaluation of 110 patients with dementias: a prospective study. Acta Neurol Scand 1991; 84: 421-5.
36. Liu CK, Lin RT, Howng SL, et al. Types of dementia in Taiwan -- a prospective study. Kao Hsiung I Hsueh K'o Hsueh Tsa Chih 1992; 8:290-8.
37. Li G, Shen YC, Li YT, Chen CH, Zhau YW, Silverman JM. A case-control study of Alzheimer's disease in China. Neurology 1992; 42:1481-8.
38. Wang PN, Wang SJ, Hong CJ, et al. Risk factors for Alzheimer's disease: a case-control study. Neuroepidemiology (in press).
39. Hill LR, Klauber MR, Salmon DP, et al. Functional status, education, and the diagnosis of dementia in the Shanghai survey. Neurology 1993; 43:138-45.
40. Henderrson VW, Paganini-Hill A, Emanuel CK, Dunn ME, Buckwalter JG. Estrogen replacement therapy in older women. Comparisons between Alzheimer's disease cases and nondemented control subjects. Arch Neurol 1994; 51:896-900.

41. Tang MX, Jacobs D, Stern Y, et al. Effect of oestrogen during menopause on risk and age at onset of Alzheimer's disease. Lancet 1996; 348:429-32.
42. Grant WB. Dietary links to Alzheimer's disease. Alzheimer's Disease Review 1997; 2:42-55.
43. White L, Petrovitch H, Ross W, et al. Prevalence of dementia in older Japanese-American men in Hawaii. The Honolulu-Asia aging study. JAMA 1996; 276:955-60.