Depressive disorders among older residents in a Chinese rural community

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ABSTRACT

Background. Two recent surveys of depression among Chinese elderly people sampled different populations, used different case ascertainment methods and resulted in a seven-fold difference in prevalence rates. The present study was conducted to compare prevalence rates obtained with two commonly used methods in the same population, and to examine the risk factors for depression.

Methods. The target population included all residents aged 65 years and over in a rural Chinese community. Participants were interviewed for demographic and medical information, examined by a neurologist and administered Chinese versions of the Geriatric Depression Scale-Short Form (GDS-S), the Cognitive Abilities Screening Instrument (CASI) and an Activities of Daily Living (ADL) form. Individuals who screened positive on the GDS-S were also interviewed by a psychiatrist for diagnosis according to the DSM-III-R criteria.

Results. Among the 1313 participants, 26% screened positive on the GDS-S and 13% were diagnosed as having a depressive disorder, including 6·1% with major depression. Individuals with depressive disorders were more likely to have poor ADL scores, lower CASI scores, and chronic physical illnesses. They were also more likely to be female, older, illiterate and without a spouse, but adding these variables did not increase the overall association with the GDS-S score.

Conclusions. Depression was quite common in this Chinese rural geriatric population. The prevalence rate was twice as high when judged by depression symptomatology rather than clinical diagnosis. The critical risk factors were functional impairments, poor cognitive abilities and the presence of chronic physical illnesses.

INTRODUCTION

Epidemiological studies of depression among the elderly have been conducted in various regions of the Western world. Reported prevalence of depressive symptoms among the elderly varied widely from 4% to 35% (e.g. Copeland *et al.* 1987; Morgan *et al.* 1987; Kennedy *et al.* 1989; Bekaroglu *et al.* 1991; Fuhrer *et al.* 1992). When standardized diagnostic criteria such as the Research Diagnostic Criteria (Spitzer *et al.* 1975) or the criteria of the diagnostic and statistical manuals of the American Psychiatric Association were used, among community surveys of individuals ⩾ 65 years of age the obtained prevalence for major depression ranged from 0·7% to 5·4%, and that for dysthymic disorder ranged from 1·0% to 8·3% (e.g. Weissman & Myers, 1978; Kramer *et al.* 1985; Copeland *et al.* 1987; Regier *et al.* 1988).

Two epidemiological surveys of depression among the Chinese elderly have been conducted recently, one in Singapore (Kua, 1990, 1992) and the other in Hong Kong (Woo *et al.* 1994). Both study sites are modern cities with fairly

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high educational and economic achievements. The Singapore study sampled residents ≥ 65 years of age and used a shortened version of the Geriatric Mental State Schedule (Copeland et al. 1976) followed by clinical diagnosis and computerized diagnosis with the AGECAT program (Copeland et al. 1986). The prevalence rates obtained for depressive disorders were 4·6% according to clinical diagnosis and 5·7% from computerized diagnosis. The Hong Kong study sampled recipients of disability allowances ≥ 70 years of age, used a shortened version (Sheikh & Yesavage, 1986) of the Geriatric Depression Scale (Brink et al. 1982), they defined cases as individuals who scored ≥ 8 on this 15-point scale and reported a much higher prevalence rate of 35%.

In addition to the widely different prevalence rates, these two studies on Chinese elders also found different relationships between age and depression. In the Singapore study, a higher rate of depression was found among the young-old than among the old-old when diagnosis was made according to clinical judgement (Kua, 1990), but no age effect was found when diagnosis was made with computerized programs (Kua, 1992). In contrast, the Hong Kong study found older age to be a risk factor for depression in univariate statistical analysis, but age was not a significant factor in stepwise logistic regression analysis (Woo et al. 1994).

The present study was conducted to determine the prevalence of depressive disorders among the Chinese elderly in a rural community. A two-phased study design was used. The first phase was comparable to the Hong Kong study in that the Geriatric Depression Scale-Short Form (GDS-S) was used to assess depression symptoms. The second phase was similar to the Singapore study in that clinical interview and diagnosis were conducted. The purposes were the following: (1) to compare the prevalence of depression according to the GDS-S with that according to clinical diagnosis in the same population, and to make clinical diagnosis of subtypes of depressive disorder according to clearly specified and commonly used criteria; (2) to compare the prevalence rates of depression obtained in the rural community with the rates obtained in the metropolitan settings of Singapore and Hong Kong; and (3) to examine the association between depression and some

demographic, medical and functional variables with both univariate and multivariate statistical analyses.

METHOD

Subjects

The present study was conducted in conjunction with the Kinmen Neurological Disorders Survey (KINDS). Detailed descriptions of the general methodology, including locality, population and methods of subject recruitment, have been reported elsewhere (Liu et al. 1997) and are briefly summarized below.

The study site was Kinmen, an islet located west of Taiwan and barely off the coast of mainland China. Its original settlers came from southeastern China several hundred years ago. From 1949 to 1992 it was a military base with restricted contact with the outside world. Aside from the military it was mainly a farming community and there was no modern industry and no resident physician with psychiatric training.

The target population included all registered residents ≥ 65 years of age in two of the four towns on this islet. Residency registration was mandatory for all citizens and the records were maintained in governmental district offices. The KINDS and the present study were conducted with governmental support and the residents' lists were obtained in 1990. The number of the target population on prevalence day, 1 August 1993, was 2055, including 880 men and 1175 women.

Assessment instruments

A Background Information Form (BIF) specially designed for the KINDS and the present study was used to gather demographic data and to enquire about chronic medical conditions including hypertension, heart disease, renal disease, pulmonary disease and diabetes mellitus.

A Chinese version of the GDS-S was used to screen for depression. The Geriatric Depression Scale has 30 questions with yes/no answers (Brink et al. 1982). Its short form, or GDS-S, consists of 15 of the questions and was developed in order to reduce fatigue and deteriorating concentration of older individuals (Sheikh & Yesavage, 1986). Scores on the GDS-S showed a high correlation with those on the original form, and a total score of ≥ 5 on the GDS-S was

considered to be indicative of depression (Burke *et al.* 1991). After translation and adaptation into Chinese and using a cut-off score of $\geqslant 8$, the GDS-S had a sensitivity of 96·3% and a specificity of 87·5% for identifying depression in a Chinese population (Lee *et al.* 1993).

A Chinese version of the 100-point Cognitive Abilities Screening Instrument (CASI) (Teng *et al.* 1994*a*) was used to assesses cognitive abilities including attention, concentration, orientation, memories of past and recent events, language and visuo-constructive abilities, category fluency, abstract thinking and judgement. This Chinese CASI (Teng *et al.* 1994*b*) had been used successfully to screen for dementia in a population similar to that of the present study (Liu *et al.* 1994). The participants' functional competence in daily activities was rated from 1 (no significant disability) to 5 (severe disability) on a Chinese version of an Activities of Daily Living (ADL) scale (Rankin, 1957).

A modified Psychiatrist Diagnostic Assessment (PDA) was used to obtain information for the clinical diagnosis of depression. The PDA is a semi-structured comprehensive psychiatric interview schedule designed specifically for the Chinese people (Hwu, 1986; Hwu & Yang, 1988), it was developed for systematic gathering of information for diagnosis according to the criteria of the Diagnostic and Statistical Manual of Mental Disorders, Third Edition (DSM-III) (American Psychiatric Association, 1980). When used in the present study, a shortened version focusing on depressive disorders was used, and some of its enquiries about depression were modified in order to cover the criteria for depressive disorders according to the revised version of the DSM-III, the DSM-III-R (American Psychiatric Association, 1987).

Procedure

The present study was conducted in August and September of 1993. To encourage participation, both the KINDS and the present study were presented and conducted as free clinics. In addition to newspaper announcements and personal letters of notification, study personnel were introduced to the participants and their families by the official chief of each residential district, a person with whom the residents were familiar. Most of the participants came to the district health clinics for assessment. For those who did not come the study personnel made home visits.

In the first phase of the study, trained field workers (medical or nursing students, or staff research assistants) interviewed participants with the BIF, the GDS-S, the CASI, and the ADL scale. In addition, all participants were interviewed and examined by one of a team of Board-certified neurologists for neurological conditions including cerebral vascular diseases, Parkinson's disease and dementia. In the second phase, participants with scores $\geqslant 5$ on the GDS-S were interviewed by one of two Board-certified psychiatrists with the use of the modified PDA. The diagnosis of depressive disorders was made according to the DSM-III-R criteria (American Psychiatric Association, 1987).

Data analysis

Descriptive and analytical statistics were computed with the use of packaged statistical programs, the SPSS for Window 5.0 (SPSS, 1992). Prevalence rate are presented as the number of cases per 100 people on prevalence day. Ninety-five per cent confidence intervals (CI) were bases on binomial distributions. An alpha value of $P < 0.05$ was chosen for statistical significance.

RESULTS

Among the 2055 targeted subjects, no contact could be made for 473 (23%) of them. The majority of the no-contact group were living with their children in Taiwan on extended visits but had retained their official residency registration in Kinmen; other individuals in this group either had died between 1990 and assessment date or were not at home during three attempted visits.

Among the 1582 contacted individuals, 127 (8%) declined participation, 95 (6%) could not complete the tests due to physical or mental impairment (e.g. aphasia, severe hearing loss, psychosis, mental retardation, or severe dementia) and 47 (3%) had incomplete data, leaving 1313 (83%) with complete data who will be designated as the 'participants'. The overall participation rate, defined as the 1313 participants from the original pool of 2055 targeted subjects, was 64%. All participants who scored $\geqslant 5$ on the GDS-S in phase one also participated

Table 1. *Demographic differences between the participants and the non-participants*

	Participants ($N = 1313$)	Non-participants ($N = 742$)	Significance
Gender ratio (M/F)	584/729, 0·80	295/447, 0·66	$\chi^2 = 4·32$ df = 1 $P < 0·05$
Age in years, mean ($\pm$ s.d.)	73·9 ($\pm$6·8)	75·0 ($\pm$8·2)	$t = 2·49$ df = 2053 $P < 0·01$
Education (yr), mean ($\pm$ s.d.)	1·5 ($\pm$2·9)	0·8 ($\pm$2·2)	$t = 4·41$ df = 1645 $P < 0·001$

Table 2. *Differences in demographic, medical, and functional variables among the three groups with respect to depression*

	Major depression N (%)	Other depressive disorder N (%)	Not depressed N (%)	Significance
Sex				
Men	26 (32·4)	32 (35·8)	526 (45·9)	$\chi^2 = 8·31$
Women	54 (67·6)	57 (64·2)	618 (54·1)	$P = 0·015$
Age (years)				
65–74	36 (45·0)	34 (38·2)	721 (63·1)	$\chi^2 = 20·20$
> 74	44 (55·0)	55 (61·8)	423 (36·9)	$P = 0·000$
Education (years)				
< 1	62 (83·8)	64 (79·0)	718 (68·3)	$\chi^2 = 11·24$
⩾ 1	12 (16·2)	17 (21·0)	333 (31·7)	$P = 0·004$
Living arrangement				
With spouse	31 (41·3)	45 (54·9)	647 (60·7)	$\chi^2 = 11·60$
Without spouse	44 (58·7)	37 (45·1)	418 (39·3)	$P = 0·003$
Chronic physical illness				
Yes	53 (67·1)	39 (45·5)	476 (42·4)	$\chi^2 = 18·32$
No	53 (32·9)	47 (54·7)	647 (57·6)	$P = 0·000$
ADL score	$1·6 \pm 1·0^{a\,c}$	$1·2 \pm 0·6^{b\,c}$	$1·0 \pm 0·4^{a\,b}$	$F = 56·80$ $P = 0·000$
CASI score	$54·5 \pm 16·7^{a}$	$55·4 \pm 16·0^{b}$	$67·2 \pm 15·1^{a\,b}$	$F = 37·48$ $P = 0·000$

[a, b, c] significant difference by *post-hoc* Duncan multiple range test.

in phase two for psychiatric interview and diagnosis. The participants had a higher men-to-women ratio and were slightly younger and better educated than the non-participants, as shown in Table 1.

Among the participants, 67 % had never attended school and 93 % had less than 6 years of formal education. With regard to their current occupation or main occupation before retirement, the distribution was 45 % farmers, 29 % housewives, 7 % soldiers, 7 % labourers, 6 % merchants, 3 % fishermen, 2 % government employees and 1 % others.

Three hundred and thirty-eight (25·7 %) of the participants scored ⩾ 5 on the GDS-S. After

psychiatric interview, 169 of the 338, or 12·9 % (95 % CI: 11·0–15·0 %) of the 1313 participants, were diagnosed as having a depressive disorder according to the DSM-III-R criteria, including 80 cases (6·1 %, 95 % CI: 4·8–7·4 %) of major depression, 67 cases (5·1 %, 95 % CI: 3·9–6·3 %) of dysthymic disorder, 17 cases (1·3 %) of depressive disorder not otherwise specified and 5 cases (0·4 %) of adjustment disorder with depressed mood.

Depressive disorder in relation to some demographic, medical and functional variables are shown in Table 2. For this analysis, the three depressive disorders other than major depression were combined into one group because of the

small number of cases in the separate categories. The results show that, in comparison to individuals not having depressive disorders, individuals with depressive disorders were more likely to be female, older, illiterate and live without a spouse; they were also more likely to have chronic physical illnesses, disabilities in activities of daily living and lower cognitive test scores.

Many of the demographic, medical and functional variables in Table 2 are interrelated. For example, on the average, women were older and had fewer years of schooling than men. To assess the relative importance of the variables in their separate association with the severity of depression as assessed by the GDS-S, a forward stepwise regression analysis was conducted. The first variable selected by the statistical programme was the ADL score; this was followed by the CASI score, and then the presence or absence of chronic physical illness. The regression equation was '(GDS-S score) = $5.4 + 1.18$ (ADL score) $+ 0.59$ (the presence of chronic physical illness) $- 0.05$ (CASI score)'. The resulting multiple correlation coefficient was 0.35 ($F = 41.57$, $P < 0.001$). The remaining variables of gender, age, years of education, and the presence or absence of a spouse did not significantly increase the association.

DISCUSSION

Among community epidemiological studies of depression, the obtained rates of depression are typically higher when depression was defined by the score on some surveying questionnaire for depressive symptoms than when clinical diagnosis was made according to more specific criteria. In agreement with this general trend, the present study found that 26% of the participants screened positive for depression on the GDS-S, but only 13% of them received a psychiatric diagnosis of depressive disorder according to the DSM-III-R criteria; these figures were also remarkably close to the corresponding figures of 27% (according to self-report) and 10% (according to clinical diagnosis with the DSM-III criteria) found in a geriatric population in Athens (Madianos *et al.* 1992). In the present study, as is usually the case in similar studies, participants were, on average, slightly younger and better educated than non-partici-

pants. Therefore, the true prevalence of depressive disorders in this population may be a little higher than the obtained figures.

Due to logistic constraints, we did not sample a subset of participants who scored below the cut-off point on the GDS-S for psychiatric interview and diagnosis. However, a cut-off point of $\geqslant 8$ on the GDS-S had a sensitivity of 96.3% and a specificity of 87.5% for depression in a Chinese population (Lee *et al.* 1993) and we used a lower cut-off point of $\geqslant 5$ instead of 8. Therefore, the false negative rate in the present study is estimated to be very small. Since Kinmen is located in the subtropical zone and the seasonal variations in climate is small, the fact that we conducted our study only in the months of August and September seems unlikely to have appreciably biased our findings.

Both the present study and the Hong Kong study (Woo *et al.* 1994) assessed depressive symptoms with the GDS-S. The present study found 26% of the participants scoring $\geqslant 5$. In contrast, the Hong Kong study found a higher percentage (35%) of its participants scoring above a higher cut-off point of $\geqslant 8$. The present study included individuals $\geqslant 65$ years of age whereas the Hong Kong study included individuals $\geqslant 70$ years of age. Using the same age range of $\geqslant 70$ and the same cut-off point of $\geqslant 8$ on the GDS-S as the Hong Kong study, the rate of 'positive' cases from the present study was 14.6% (95% CI: 12.3–16.9%), which was significantly lower than the Hong Kong finding of 35% (95% CI: 33.7–26.4%) (without overlapping of confidence intervals). Since the Kinmen study included all resident elders, whereas the Hong Kong study sampled only recipients of old age disability allowances, the lower rate of depressive symptoms found in Kinmen is understandable in view of the present finding that functional disability was the most important variable associated with depressive symptoms.

Both the second phase of the present study and the Singapore study involved psychiatric interview and clinical diagnosis, but the two studies used different interview schedules for different diagnostic criteria. The DSM criteria used in the present study have been considered by some to be more suitable for hospital cases and somewhat insensitive in detecting depression in community settings (Blazer *et al.* 1987;

Henderson, 1993), yet the rate of depressive disorders obtained in the present study (13%, 95% CI: 11–15%) was appreciably higher than the 4·6% (95% CI: 2·9–6·3%) rate found by clinical diagnosis and the 5·7% (95% CI: 3·9–7·5%) rate found by computerized diagnosis in the Singapore study (Kua, 1990). Since Kinmen is a rural community with limited medical care and the majority of the participants had little or no formal education, the higher rate of depressive disorder found in Kinmen than in Singapore is consistent with the present finding on risk factors as well as with an earlier finding that depression was more prevalent among elders with lower socio-economical status (Murphy, 1982). It should be cautioned, however, that in both the present and the Singapore studies clinical diagnosis was made by one psychiatrist alone and there were no data on inter-judge agreement.

The present study showed that, among the various demographic, medical and functional variables examined, the preponderance of depressive symptoms was most closely associated with disabilities in activities of daily living, poor cognitive functioning and the presence of chronic physical illness. Both functional disability (Griffiths *et al.* 1987; Livingston *et al.* 1990; Bekaroglu *et al.* 1991) and physical illness (Murphy, 1982; Maule *et al.* 1984; Carpiniello, 1989; Palinkas *et al.* 1990; Woo *et al.* 1994) have been found to be associated with depression in the aged. Our results are consistent with these finding and it seems reasonable to assume that in many cases depression is a consequence of functional limitations and physical illnesses. Although an association between depression and cognitive impairment is also commonly observed (Kay *et al.* 1985; Griffiths *et al.* 1987; Scherr *et al.* 1988; Lindesay *et al.* 1989), the direction of causation is more ambiguous. While poorer cognitive abilities may result in poorer coping abilities and consequent depression, depression may also cause poorer performance on cognitive tests. In addition, both cognitive abilities and mood can be negatively affected by some common cerebral disorders of old age such as Parkinson's disease, Alzheimer's disease and stroke.

Although older age (Woo *et al.* 1994) and female gender (Murrell *et al.* 1983; Berkman *et al.* 1986; Palinkas *et al.* 1990; Bekaroglu *et al.* 1991) have been found to be associated with higher rates of depression, a lack of such association has also been reported for age (Kay *et al.* 1985; Kua, 1990; Livingston *et al.* 1990) and for gender (Gurland *et al.* 1982). Consistent with the findings from the Hong Kong study, the present study showed that older age and female gender were associated with higher scores on the GDS-S in univariate analysis only, but age and gender became non-significant contributors in multivariate analysis. To what extent these findings can be generalized to other populations remains to be seen, but they do give an encouraging outlook. Whereas gender and age are immutable biological conditions, education and medical care could be improved with societal and individual efforts and might help reduce depression in old age.

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