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Depressive symptoms in Chinese Americans with Cognitive Impairment

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Abstract

Objectives—To assess the prevalence of geriatric depression in Chinese American patients with cognitive impairment and to compare the prevalence to that of cognitively normal elderly Chinese Americans and Caucasians.

Design—We compared rates of depressive symptomatology in elderly Chinese Americans to a matched group of Caucasians, with and without dementia, and assessed rates of treatment for depression across all groups.

Setting—Academic subspecialty referral clinic.

Participants—Participants included a total of 137 elderly, cognitively impaired and cognitively normal Chinese Americans and 140 Caucasians with and without cognitive impairment.

Measurements—Demographic (e.g. age, education, race, language ability), cognitive (MMSE score), medical (e.g. cardiovascular morbidity) and functional (Clinical Dementia Rating Scale) risk factors were assessed for association with depressive symptomatology as measured by the Geriatric Depression Scale (GDS).

Results—Depression (GDS score ≥ 6 out of 15) was significantly more common in cognitively impaired Chinese Americans (35%) versus cognitively impaired Caucasians (15%, $\chi^2 = 33.8$, $p<0.05$), and Chinese Americans were less likely to be on treatment for depression (12%) than Caucasians (37%, $\chi^2 = 41$, $p<0.05$). Cognitive and functional impairment, age and education were

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all independent predictors of GDS score. Rates of depression were not significantly different in cognitively normal Chinese American (6%) and Caucasian (0%) groups.

Conclusions—These findings indicate that elderly Chinese Americans with cognitive impairment are at significantly increased risk for unrecognized depression and that education, and/or other cultural factors associated with education may contribute to this risk.

Keywords

geriatric depression; dementia; Chinese American

Objective

Depression, one of the most common mental disorders, affects approximately 26 percent of Americans over the age of 60 (lifetime prevalence, http://www.nimh.nih.gov/statistics). In the elderly, the effects of depression can be superimposed on cognitive impairments, leading to increased disability and mortality, shortened time until nursing home placement, worsened caregiver burden, and greater health care costs (1–6). It is also being recognized that ethnic, racial and socioeconomic factors influence the rates of depression, as well as other neuropsychiatric symptoms in patients with and without cognitive impairment (7, 8). Ethnic, cultural, and socioeconomic barriers also affect the rates of treatment and discontinuation of treatment for depression (9, 10). These factors suggest that clinicians need to be vigilant in recognizing depression in the elderly, especially in the setting of cognitive impairment or dementia. Patients who are members of an ethnic minority or otherwise disadvantaged group may require particular attention.

Asian Americans are one of the fastest growing populations in the United States, and among Asian Americans, Chinese Americans are the largest group, representing 23% (http://www.census.gov/acs/www/). The life expectancy of Chinese Americans living in the U.S is in the mid 80's (http://www.census.gov/population/www/projections/index.html). Given that the incidence of dementia increases steadily with age (11), we can expect an increasing need for geriatric dementia care in this group. Although Asian Americans represent about 5% of the U.S. population, they are not well represented in clinical research, including studies of dementia (12, 13). Many Chinese Americans are immigrants who are not well integrated into western culture (*e.g.*, live in social enclaves, do not learn English, do not eat a Western diet), and thus like other minorities, they could be at increased risk of depression that may go untreated (14, 15). Although earlier studies looking at neuropsychiatric symptoms in dementia have included Asian Americans, no prior studies have specifically examined the prevalence of depressive symptoms in Chinese Americans with dementia or cognitive impairment, nor have they examined whether the patterns of treatment in this setting differ when compared to other groups.

The goals of this study were a) to examine the prevalence of depression and treatment patterns in a cohort of Chinese Americans referred for subspecialty neurological evaluation of cognition, b) to compare the Chinese American group with a group of age-matched Caucasians referred for a similar evaluation, and c) to examine the demographic and clinical variables associated with depressive symptomatology in Chinese Americans.

Methods

Participants and Assessment

A total of 277 participants who underwent clinical assessment through the UCSF Memory and Aging Center (MAC) were included in this analysis using data from their first clinical evaluation (Table 1). The study group included 137 Chinese Americans evaluated between 2003 and 2009 and 140 Caucasian participants selected from the UCSF Alzheimer's Disease Research Center (ADRC) database to match the Chinese American group in terms of age and level of cognitive and functional impairment. Across both ethnic groups, the sample consisted of 96 normal older controls and 184 participants with mild cognitive impairment (MCI) or dementia secondary to Alzheimer's disease (AD).

Participants were recruited through several venues. As part of its outreach efforts, the UCSF MAC maintains two outreach clinic sites in San Francisco's Chinatown where Chinese-speaking patients can be referred for cognitive evaluation (16). In addition, patients from the regular MAC cognitive assessment clinic at UCSF are recruited into the ADRC, and some patients are self-referred or referred by other practitioners directly into our research studies. Cognitively normal participants were recruited through newspaper advertisements, community health fairs, fliers and word-of-mouth. Chinese-speaking participants who spoke one of the two most common dialects, Mandarin and Cantonese, were enrolled.

The clinical evaluation includes a history and examination, including recording of past medical problems and current medication use, neuropsychological testing, and concurrent history from a knowledgeable informant to provide ancillary information about the participant's level of functioning. All participants in the ADRC, including controls, are required to have a study partner. Clinical diagnosis is established at a consensus conference where the clinical history, informant report and results of cognitive testing are reviewed, and the diagnosis is then made according to established criteria. For a diagnosis of MCI a history, either from the participant or their informant, of persistent cognitive impairment representing a significant decline from the patient's baseline level of functioning was required (17). AD was diagnosed according to established criteria (18). Controls were required to have no cognitive changes endorsed by the subject or noted by their informant, no history of neurological or psychiatric illness that might affect cognition, and cognitive performance within the range of normal age-matched controls on formal testing.

All participants underwent formal cognitive evaluation. For participants who were proficient in English, the MAC uses a testing battery that includes a comprehensive assessment of verbal and visual episodic memory, visual-spatial function, language, calculation abilities, and frontal/executive functions, and this battery has been described previously (19), however, almost none of the measures used in this battery have been validated for administration in Chinese, so patients whose primary language was Chinese were tested using the Chinese version of the Cognitive Abilities Screening Instrument (CASI-C, (20)), which provides a broad assessment of memory, language, visuospatial abilities and some frontal/executive functions. In addition to being valid for use in Chinese-speaking participants, the CASI has cutoffs for normal performance in individuals with low levels of education. A Mini Mental State Exam (MMSE) score can be derived from the CASI. The

fact that many participants were tested using the CASI while others were tested using the standard MAC battery meant that a direct comparison of cognitive performance between groups on tasks other than the MMSE was not possible. The clinical evaluation included functional assessment using the Clinical Dementia Rating Scale (CDR, (21)), which is based on information from the patient as well as the informant.

Mood was assessed using the Geriatric Depression Scale (GDS, (22)), which has been used previously to measure depressive symptoms in Chinese American elders (23, 24). The GDS is available as a 15-item as well as a 30-item version that includes all the items in the 15-item version. In both ethnic groups, most participants completed the GDS-30, although some participants completed the GDS-15. To allow inclusion of as many participants as possible, GDS-15-equivalent scores were extracted for all participants who completed the GDS-30, and all the depression data were analyzed as GDS-15 scores. Due to limited literacy in some Chinese participants, GDS data were collected verbally in Chinese during their clinical visits. Participants who were proficient in English completed GDS-15 via self-report questionnaires.

The protocol was approved by the UCSF Committee on Human Research.

Variables and analytic procedures

Demographic variables, including age, sex and education level, and clinical variables were compared across groups using ANOVA or chi-square tests as appropriate. Because the primary goal was to compare ethnic groups with similar diagnoses, ANOVAs and overall chi-square tests were followed up by comparing ethnic groups within diagnostic categories (e.g. Chinese American vs. Caucasian cognitively impaired and Chinese American vs. Caucasian normal controls). Treatment with antidepressants was coded as present or absent based on the medication list brought in by the patient and/or their caregiver at the time of evaluation. Patients taking any medication with an FDA-approved indication for depression were considered as being on an antidepressant. Herbal treatments or other supplements were not considered in this analysis, because the contents of these preparations are often difficult to ascertain or verify.

Because of the known association between depression and cardiovascular morbidities (25), the presence of diabetes, hypertension, hyperlipidemia, history of myocardial infarction, and history of stroke were extracted from the medical records and coded as present or absent. Global cognition was represented by the MMSE score, and level of function was represented by the CDR. Each participant was asked about their competency in speaking English for casual conversation, and their language abilities were coded as English only, bilingual English/Chinese or Chinese only, based on their response. To estimate the prevalence of significant depressive symptomatology, we used a GDS cutoff of 6 or greater. Some of the participants in our group had very low levels of education, raising the concern that their scores might be influence by this factor. There is very little data available about the influence of very low education on GDS score, however one Korean group found that optimal cutoff scores for depression were slightly higher for low education individuals (26). Extrapolating from these findings, a one point adjustment for low education individuals

might be reasonable. Thus, we also examined the prevalence of depression using a cutoff score of 7 for individuals with less than 12 years of education.

In order to examine the clinical and demographic factors associated with depressive symptomatology, we used linear regression, with GDS-15 score as the dependent variable. Because we were interested in culturally and ethnically specific factors that might contribute to depression, the statistical model was constructed in levels, with the first level including independent variables that would likely predict depression but are not of primary interest for this study including diagnosis, age, gender, MMSE score, and CDR score. Variables of interest, including ethnicity and level of education were then added in separate steps to evaluate the additional explanatory power for each of these factors. Lastly we added cardiovascular risk factors to ensure that these did not alter our predictive model. We did not include language ability in the final analysis as it was highly correlated with ethnicity ($p<0.000$). All analyses were carried out using SPSS (version 17; IBM, Armonk, NY).

Results

Table 1 shows the demographic and clinical features in the four study groups. The proportion of women and the proportion of patients with MCI and AD were similar in the Chinese American and Caucasian groups, as were the MMSE and CDR scores within each diagnostic category. The cognitively impaired Chinese American group was the oldest group, and this group was also significantly less educated than the other study groups. Also, 71% of this group spoke only Chinese and 19% were bilingual, in contrast to the Chinese American controls, 44% of whom were bilingual. The prevalence of diabetes was significantly higher in the group of Chinese Americans with cognitive impairment as compared with both Caucasian groups (cognitively impaired and controls), but the prevalence of other cardiovascular morbidities was similar across all the groups.

The frequency of depression was significantly higher in Chinese Americans with cognitive impairment compared with the Caucasians with cognitive impairment (35% vs. 15%). After adjusting for low education, the frequencies were 30% in Chinese Americans vs. 15% in Caucasians (Chi-square 6.047, $p < 0.05$). Although the frequency of depression was slightly higher in the Chinese American controls compared to Caucasian controls (6% vs. 0%), this difference was not statistically significant. Additionally, Chinese Americans with cognitive impairment were significantly less likely to be taking an antidepressant than cognitively impaired Caucasians (12% vs. 37%). Rates of antidepressant use were similar in the Chinese American and Caucasian controls.

Linear regression revealed that several variables were independently associated with GDS-15 score (Table 2). These included a diagnosis of MCI or AD, age, and severity of functional impairment (CDR score). As would be expected based on the group comparison, being Chinese American was also a significant predictor when this was added to the model (change in $R^2 = 0.042$, $p < 0.001$). Education also made a significant contribution to the model (change in $R^2 = 0.03$, $p = 0.002$), and ethnicity continued to be a significant factor even after the addition of education. The addition of cardiovascular risk factors did not significantly improve the predictive value of the model overall (change in $R^2 = 0.014$, $p =$

0.45), nor did it affect the predictive value of ethnicity or education, and only hyperlipidemia was modestly associated with GDS-15 score ($p = 0.08$).

Conclusions

In a group of older Chinese Americans with cognitive impairment, we found that the prevalence of depressive symptoms was significantly higher than in a group of Caucasians with similar cognitive and functional status. In addition to ethnicity, several factors including cognitive and functional impairments, older age and lower education were independently associated with increased depressive symptomatology. Treatment with antidepressants was significantly less common in cognitively impaired Chinese Americans than in Caucasians.

These findings are consistent with prior studies indicating that depression is a common neuropsychiatric symptom in the setting of MCI and dementia, and the frequencies for depression we observed are within the broad range of prevalence estimates in these conditions, which range from 20 to 50% (4, 6, 8, 27–35). However, due to a lack of similar studies, it is difficult to directly compare the results from the current analysis to findings from previous authors. Only a few studies of behavior and depression in MCI and dementia have included non-Caucasian participants and/or described the racial and ethnic breakdown of their samples (4, 6, 29), and only one directly discussed the differences in neuropsychiatric symptoms across different ethnic groups (8). The latter study included a substantial proportion of Asian-Pacific Islanders (about 50%) and suggested a lower rate of neuropsychiatric symptoms in African Americans compared to other ethnic groups. Because they did not include Caucasians in their sample, a direct comparison to the present study cannot be made.

The literature on ethnic Chinese and, specifically, Chinese Americans also reveals a wide range of findings regarding depression. Large population-based studies of individuals 18–65 years old have found relatively low rates of depression in Asian Americans compared to Caucasians, in the range of 3 to 5% (15, 36–38). On the other hand, studies of older Chinese individuals have revealed higher rates of depressive symptoms, ranging from 18% to as much as 45% (39–41). These prevalence estimates are higher than those found in US community-based samples that estimated the prevalence to be about 10 to 12% and likely included mostly non-minorities (6, 34). With regard to cognition, one study in ethnic Chinese concluded that there was no relationship between cognition and depression (41), but the cognitive assessment was limited to the MMSE, which is not sensitive to milder levels of cognitive impairment (17). Other studies examining levels of depression in older Chinese cohorts did not assess cognition (39, 40). Thus, there have been no previous studies directly comparing rates and risk factors for depressive symptoms in older Chinese Americans and matched Caucasians in the setting of cognitive impairment.

Our findings in the cognitively normal group address several questions that arise from prior studies of depression in Chinese elders. Although the rate of depression in the Chinese American control group was slightly higher than in the Caucasian control group, this difference was not significant. The finding of relatively similar rates of depression in the

Chinese American and Caucasian control groups suggests that being Chinese American *per se* may not be associated with a significantly increased prevalence of geriatric depression when compared to Caucasians. Because many in our cohort were bilingual or monolingual, it also appears that language abilities alone are not a significant determinant of depression in cognitively normal Chinese Americans. Additionally, the relatively similar prevalence of depression in both groups of cognitively normal elders may suggest that depression is different in older Chinese Americans as compared to younger ones, because prior studies have suggested lower rates of depression in non-elderly Asians as compared to age-matched Caucasians (15, 37, 38). Further investigation of this theory would require larger samples representing the full age spectrum, and if such studies were cross-sectional, they would have to address cohort effects. It should be noted, however, that because our control subjects were highly educated, they may not be an accurate indicator of the level of depression in cognitively normal Chinese elders with lower levels of education.

In contrast to the control group, the cognitively impaired group of Chinese Americans included a larger number of individuals with low education. In our analysis, education was significantly associated with depressive symptomatology, even after accounting for ethnicity. Whether education is the true risk factor or a surrogate for other factors such as income, family and community support, and/or integration into Western society (acculturation, which may include English language ability) needs to be directly addressed using specific measures targeted at all of these factors. Indeed, prior studies reporting relatively high rates of depression in Chinese Americans have highlighted the potential role of acculturation as a contributor of risk, although the role of cognitive impairment was not assessed in these studies (14, 40). Other studies of US minorities have also suggested a relationship between depression and factors that could represent acculturation. For instance, a study of Vietnamese people living in the US showed that clinical depression rates are elevated in those who are relatively poor and not proficient in English, among other factors (7).

Along with the increased prevalence of depression in Chinese American patients, we found that this group was less likely to be treated for their depression, which could in itself account for the increased number of depressive symptoms observed in our cohort. Given the study design, we are not able to assess whether education, language, and other cultural factors are risks for developing depression, or if they are instead risk factors for not having it recognized and treated. It is notable, however, that the patients in this study had been referred for evaluation of cognitive impairment. This would suggest that if these factors or other issues associated with them impede the recognition and treatment of depression, they do so in spite of identification of other mental disorders. One major issue that may contribute to this low likelihood of being treated for depression is the stigma associated with depression. A Canadian survey indicated that depression is associated with significant stigma, with respondents identifying depressed people as unpredictable and dangerous, and these attitudes are more likely to be endorsed in immigrants and people with lower levels of education (42). The impact of these attitudes can be seen in a study which found that 50 percent of Chinese Americans screening positive for depression at a community center refused to have further assessment or treatment (15). The effects of these attitudes may be

further exacerbated by cultural tendencies that cause some Chinese Americans to express their emotions less than Caucasians (43). These findings indicate that cultural factors in ethnic Chinese may make them less likely to express their depressive symptoms to their physicians. Cultural issues of this type could also influence the likelihood of physicians probing for or treating depressive symptoms (44).

The results of our analysis support prior findings indicating relatively high rates of depression in older Chinese Americans. Additionally, the current study suggests that cognitive impairment, education and other cultural factors contribute significantly to depression in this population, perhaps in part by influencing the likelihood of depression being recognized and treated. More attention should thus be paid to risk factors associated with depression in older Chinese Americans, particularly those with cognitive impairment.

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Table 1

Sample demographics.

		Controls		Cognitively Impaired	
		Chinese	**Caucasian**	**Chinese**	**Caucasian**
Age	F (2,276) = 23.05*†¥	60 (9.4)	67.7 (8.6)	73.8 (10.2)	70.7 (9.5)
Education (yrs)	F (2,276) = 22.8*¥	15.7 (3.3)	15.8 (2.4)	11.7 (5.7)	16 (2.4)
Gender (% male)	χ^2 = 6 (NS)	31%	27%	41%	46%
Diagnosis	χ^2 = 280*	100% Normal	100% Normal	53% MCI 47% AD	53% MCI 47% AD
Language	χ^2 = 251*	10% English Only 44% Bilingual 46% Chinese Only	-	10% English Only 19% Bilingual 71% Chinese Only	-
MMSE Score	F (2,273) = 23.2*	28.9 (1.2)	29.5 (6.1)	22.9 (6.1)	23.8 (7.5)
CDR Score	F (2,268) = 42.1*	0	0	0.67 (0.47)	0.76 (0.74)
Depression prevalence (GDS ≥ 6)	χ^2 = 33.8*¥	6%	0%	35%	15%
Antidepressant use	χ^2 = 41*¥	4% Yes 96% No	4% Yes 96% No	12% Yes 88% No	37% Yes 63% No
Prevalence Hypertension	χ^2 = 5.8 (NS)	35% Yes 65% No	40% Yes 60% No	52% Yes 48% No	37% Yes 63% No
Prevalence Diabetes	χ^2 = 21*¥	13% Yes 87% No	4% Yes 96% No	22% Yes 78% No	2% Yes 98% No
Prevalence Hyperlipidemia	χ^2 = 2.4 (NS)	35% Yes 65% No	44% Yes 56% No	49% Yes 51% No	44% Yes 56% No
History Myocardial Infarct	χ^2 = 3 (NS)	0% Yes 100% No	0% Yes 100% No	3% Yes 97% No	2% Yes 98% No
History Stroke	χ^2 = 7 (NS)	2% Yes 98% No	0% Yes 100% No	8% Yes 92% No	2% Yes 98% No

* = Significant across four groups (ANOVA or χ^2)

† = Significantly different in Normal Chinese vs. Normal Caucasian

¥ = Significantly different in Impaired Chinese vs. Impaired Caucasian

Sample Demographics are provided for control and cognitively impaired individuals by ethnicity. Test statistics (F statistic for ANOVA or χ^2) are provided along with significance across groups as indicated by symbols ($p < 0.05$).“NS” means there were no significant differences between or across groups.

Table 2

Risk factors for depression in cognitively impaired Chinese Americans.

Model	R^2 model	R^2 change	p_{change}	predictor	$P_{predictor}$
1	0.127	0.127	<0.001	*diagnosis*	<0.001
				age	0.05
				gender	0.739
				MMSE	0.086
				CDR	0.015
2	0.169	0.042	<0.001	*diagnosis*	<0.001
				age	0.073
				gender	0.751
				MMSE	0.222
				CDR	0.045
				ethnicity	0.000
3	0.198	0.030	0.002	*diagnosis*	<0.001
				age	0.014
				gender	0.277
				MMSE	0.363
				CDR	0.038
				ethnicity	0.015
				education	0.002
4	0.213	0.014	0.455	*diagnosis*	<0.001
				age	0.011
				gender	0.352
				MMSE	0.373
				CDR	0.060
				ethnicity	0.014
				education	0.003
				hypertension	0.280
				diabetes	0.357
				history MI	0.517

Model	R^2 model	R^2 change	p_{change}	predictor	$P_{predictor}$
				history stroke	0.488
				hyperlipidemia	0.081

Model 1. Predictors (constant): diagnosis (normal, mild cognitive impairment or Alzheimer's disease), age (in years), gender (male or female), total Mini Mental State Exam (MMSE) score, total Clinical Dementia Rating Scale (CDR) score
Model 2. Predictors + *ethnicity (Chinese American or Caucasian)*
Model 3. Predictors + ethnicity + *education (in years)*
Model 4. Predictors + ethnicity + education + *hypertension (yes/no), diabetes (yes/no), history myocardial infarct (MI, yes/no), history of stroke (yes/no), hyperlipidemia (yes/no)*