

Impact of Sociodemographic and Diabetes-Related Factors on the Presence and Severity of Depression in Immigrant Chinese Australian People With Diabetes

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Maintaining psychological well-being is an integral part in the overall care of people with diabetes, and, in recent years, there has been an increased interest in this area.¹ Depression has also been found to be more common in diabetes.² Moreover, the coexistence of depression and diabetes significantly increases the likelihood of developing complications.³ With early treatment for depression, people with diabetes may be able to minimize these serious complications. Therefore, timely detection and accurate assessment of depression is important, and regular screening for this condition has been recommended by many professional bodies, including the International Diabetes Federation, the American Diabetes Association, and the U.K. National Institute for Health and Clinical Excellence.⁴

The gold standard for assessing depression is a structured patient interview by an experienced clinician, but time and cost restrict this format for screening purposes. By contrast, self-administered questionnaires are easy to apply and cost-effective. One of the most commonly used instruments to measure depression is the Patient Health Questionnaire-9 (PHQ-9), developed in the United States.^{5,6} In addition to the original instrument in English, a validated version of the PHQ-9 in Chinese already exists.⁷ In a study conducted by Jin et al.,⁷ the Chinese

version of the PHQ-9 was tested on 1,275 elderly individuals and showed a Cronbach's alpha coefficient of 0.767, indicating good validity, with a sensitivity of 88.31% and a specificity of 82.50%. The availability of this translated instrument opens the possibility for its wider use for clinical and research purpose in diabetes.

Australia is a multicultural society. In 2012, the Chinese population made up 7% of the total immigrant Australian population. China has become one of the top five citizenship countries contributing to net overseas migration in Australia.⁸

For immigrants, adapting to a new cultural setting is a major

challenge. Research has shown that immigrants may experience depression, culture shock, and suicidal tendency when they begin their lives in a new country.⁹ Furthermore, diabetes occurs more commonly in certain ethnic groups, and the prevalence of diabetes among Chinese immigrants is among the highest.¹⁰ Given the exaggerated impact of coexisting depression and diabetes on ethnic Chinese Australians, studying the extent and predisposing factors of depression in this setting is of clinical importance. To our knowledge, there have been no studies of depressive disorders in immigrant Chinese Australians with diabetes.

The goal of this cross-sectional, observational study was to investigate the presence and severity of depression in immigrant Chinese Australian people with diabetes and to define key sociodemographic and diabetes-related factors that may influence its development.

Methods

Participants and procedures

During a 7-week period, all ethnic Chinese people with diabetes born outside of Australia and who have resided in Australia for at least 1 year were approached to complete the translated PHQ-9 questionnaire and a combined questionnaire about their sociodemographic and diabetes-related clinical data. This

IN BRIEF

The coexistence of depression with diabetes significantly increases the likelihood of developing complications. This study aimed to describe the presence and severity of depression in immigrant Chinese Australian people with diabetes and explore its relationship to sociodemographic and diabetes-related factors. This study found that approximately one-fifth of immigrant Chinese Australian people with diabetes had symptoms consistent with moderate to severe depression and that individuals who are socially isolated and have more complex treatment and complications of diabetes are particularly at risk.

took place when they attended the Diabetes Centre of Royal Prince Alfred Hospital for a routine follow-up visit. A trained research nurse explained the aims and details of the study to and obtained verbal consent from all participants. This study was approved by the Sydney Local Health District Ethics Review Committee. Overall, 104 patients were invited, and only 4 patients declined, all because of a lack in time. In 90% of cases, patients completed the two questionnaires on their own. However, if any patient was unable to read because of difficulty with either vision or literacy, the research nurse read the questionnaires to the patients and entered their responses. Respondents took about 10 minutes each to complete the questionnaires.

Translated Chinese PHQ-9 questionnaire

The translated Chinese version of the PHQ-9, validated by Jin et al.,⁷ was used to determine participants' current level of depression severity. Symptoms experienced by participants during the 2-week period before they took the surveys were assessed. On the basis of participant response to the frequency of any particular symptom (0 = not at all, 1 = several days, 2 = more than half of the days, 3 = nearly every day), a total score ranging from 0 to 27 was obtained, with higher scores indicating patients' increased self-report of depression severity. The arbitrary division of PHQ-9 scores into ratings of minimal (0–4), mild (5–9), and moderate to severe depression (≥ 10) suggested by Reddy et al.¹¹ was used in this study.

Sociodemographic and diabetes status questionnaire

An additional questionnaire to elicit sociodemographic information and diabetes data was also prepared in Chinese. The questionnaire included items in the following areas:

- Immigration-related variables: age at time of migrating to Australia and length of time since immigration
- Communication: ability to speak English, language of TV programs watched, and frequency of telephoning overseas to contact Chinese friends or relatives
- Social interaction: time spent alone each day and number of family members living together
- Socioeconomic status: education level and employment status
- General well-being: quality of sleep, hours of sleep each night, exercise activity, smoking, and alcohol consumption
- Medical history of depression: personal and family
- Critical life events: bereavement in the previous year
- Other: sex, age, and marital status
- Diabetes-related data: duration and type of diabetes, treatment, A1C, blood pressure, lipid profile, and presence of diabetes complications

The research nurse obtained clinical data related to diabetes (A1C, blood pressure, lipid profile, and complications) by examining participants' medical files.

Statistical analysis

Numerical data were presented as mean \pm standard deviation (SD) or percentages. Comparison between groups was performed by χ^2 test for categorical data (Pearson's χ^2 test or a likelihood ratio χ^2 test were used). Analysis of variance was used to test for differences between groups for continuous variables. Variables that showed significant associations with depression in univariate analysis and some others selected by researchers were used as independent variables in a multivariate regression analysis. The quality of sleep variable was not included in the multivariate regression analysis because it is considered

to be a symptom of depression instead of being a predictor of depression. Statistical significance was based on two-sided tests and accepted at the $P < 0.05$ level of significance. SPSS Version 16.0 (SPSS, Chicago, Ill.) was used for statistical analyses.

Results

There were 58, 23, and 19 patients with PHQ-9 scores of 0–4, 5–9, and > 10 , respectively. Individual results ranged from 0 to 26. The sociodemographic characteristics of each group are shown in Table 1, and their diabetes status is described in Table 2.

By univariate analysis, proficiency in speaking English, age at time of immigration, length of time in Australia, time spent alone each day, and presence of exercise activity were significantly different between the PHQ-9 groupings (Table 1). No significant differences were found in their sex, age, marital status, education level, employment status, number of family members living together, or frequency of telephoning overseas to speak to Chinese friends or family members.

The three PHQ-9 subgroups were also different in their diabetes treatment, glycemic control, presence and number of chronic complications, and history of previous hypoglycemia. Of these statistically significant factors, the impact of glycemic control was relatively modest (Table 2).

Of all the individual factors examined, there was a significant strong correlation between the score for quality of sleep and the PHQ-9 scores (Figure 1). By multivariate analysis, PHQ-9 scores were found to be independently determined by previous history of hypoglycemia, number of chronic complications, time spent alone, presence of chronic complications, and ability to speak English. These factors collectively

Table 1. Sociodemographic Factors and Their Relationship to PHQ-9 Score

Factors	Minimal Depression (n = 58)	Mild Depression (n = 23)	Moderate to Severe Depression (n = 19)	χ^2/IF	P
Sex [n (%)]					
Male	32 (55.2)	13 (56.5)	10 (52.6)	0.065	0.968
Female	26 (44.8)	10 (43.5)	9 (47.4)		
Marital status [n (%)]					
Married	49 (84.5)	18 (78.3)	13 (68.4)	2.234	0.327
Other	9 (15.5)	5 (21.7)	6 (31.6)		
Age (years)*	61.4 ± 13.4	63.5 ± 12.3	62.5 ± 16.7	0.199	0.820
Age at time of immigration (years)*	33.8 ± 13.3	41.7 ± 14.9	41.7 ± 17.3	3.595	0.031
Length of time in Australia (years)*	27.6 ± 13.2	21.2 ± 9.2	20. ± 11.7	3.591	0.031
Education level [n (%)]					
Less than senior high school	23 (39.7)	9 (39.1)	9 (47.4)	3.049	0.550
Senior high school	14 (24.1)	7 (30.4)	7 (36.8)		
College or above	21 (36.2)	7 (30.4)	3 (15.8)		
Employment status [n (%)]					
Employed	20 (34.5)	7 (30.4)	4 (21.1)	1.211	0.546
Unemployed/retired	38 (65.5)	16 (69.6)	15 (78.9)		
Number of family members living together [n (%)]					
0	6 (10.3)	1 (4.3)	3 (15.8)	4.823	0.306
1	25 (43.1)	6 (26.1)	8 (42.1)		
≥ 2	27 (46.6)	16 (69.6)	8 (42.1)		
English level [n (%)]					
Good (speaks English very well; does not need interpreter)	37 (63.8)	5 (21.7)	4 (21.1)	21.810	< 0.001
Fair (speaks a little bit of English; needs interpreter)	10 (17.2)	5 (21.7)	3 (15.8)		
Poor (does not speak English at all)	11 (19.0)	13 (56.5)	12 (63.2)		
Language of TV programs watched [n (%)]					
Chinese	32 (55.2)	18 (78.3)	14 (73.7)	4.765	0.092

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Table 1. Sociodemographic Factors and Their Relationship to PHQ-9 Score, continued from p. 165

Factors	Minimal Depression (n = 58)	Mild Depression (n = 23)	Moderate to Severe Depression (n = 19)	χ^2/IF	P
English	26 (44.8)	5 (21.7)	5 (26.3)		
Frequency of telephoning overseas Chinese people [n (%)]					
0 times/month	17 (29.3)	8 (34.8)	7 (36.8)	4.547	0.337
0–1 time/month	11 (19.0)	6 (26.1)	7 (36.8)		
> 1 time/month	30 (51.7)	9 (39.1)	5 (26.3)		
Smoker [n (%)]					
Current smoker	5 (8.6)	1 (4.3)	3 (15.8)	1.640	0.440
Current nonsmoker	53 (91.4)	22 (95.7)	16 (84.2)		
Alcohol consumption [n (%)]					
Sometimes	7 (12.1)	1 (4.3)	3 (15.8)	1.780	0.411
Never	51 (87.9)	22 (95.7)	16 (84.2)		
Recent bereavement [n (%)]					
Yes	5 (8.6)	2 (8.7)	0 (0)	3.072	0.215
No	53 (91.4)	21 (91.3)	19 (100)		
Exercise activity [n (%)]					
Yes	49 (84.5)	14 (60.9)	12 (63.2)	6.652	0.036
No	9 (15.5)	9 (39.1)	7 (36.8)		
Time spent alone each day [median hours (range)]*	1.5 (0–10)	2.5 (0–7)	4.0 (0–12)	3.913	0.023

*Continuous variables are presented as mean \pm SD or median (range).

explained 36.4% of the variance in PHQ-9 scores ($F = 14.429$, $P < 0.001$).

Discussion

To the best of our knowledge, this is the first study to examine depression in immigrant Chinese Australians also affected by diabetes. It found that 42% of participants exhibited mild to severe depressive symptoms based on a cut-off PHQ-9 score ≥ 5 . Using a higher PHQ-9 threshold of > 10 to identify patients who were more likely

to have a clinically significant grade of moderate to severe depression, 19% of the participants were affected.

Interestingly, despite the questionnaire responses indicating a high likelihood of depression in our cohort, only 2% of our patients had a history of previously diagnosed depression, suggesting under-diagnosis of depression in this population. In a recent survey of Australian adults with diabetes using the same screening instrument and

cut-off score, more than one-fourth of participants were found to have moderate to severe symptoms of depression.¹¹ These findings indicate considerable under-recognition of depression in the Chinese immigrant population, a conclusion supported by previous studies.^{10,12}

Cultural attitudes often influence whether depression is diagnosed in a clinical setting. In the Chinese culture, depression is seen as a sign of weakness or shame, and the

Table 2. Diabetes-Related Factors and Their Relationship to PHQ-9 Score

Factors	Minimal Depression (n = 58)	Mild Depression (n = 23)	Moderate to Severe Depression (n = 19)	χ^2/IF	P
Type of diabetes [n (%)]					
Type 1	3 (5.2)	0 (0)	2 (10.5)	3.303	0.296
Type 2	55 (94.8)	23 (100)	17 (89.5)		
Diabetes treatment [n (%)]					
No medication	6 (10.3)	0 (0)	0 (0)	19.388	0.001
Oral only	29 (50.0)	17 (73.9)	4 (21.1)		
Insulin or insulin + oral	23 (39.7)	6 (26.1)	15 (78.9)		
History of previous hypoglycemia [n (%)]					
Yes	7 (12.1)	6 (27.3)	15 (78.9)	31.573	< 0.001
No	51 (87.9)	16 (72.7)	4 (21.1)		
Presence of chronic complications [n (%)]					
Yes	14 (24.1)	9 (40.9)	12 (63.2)	9.916	0.007
No	44 (75.9)	13 (59.1)	7 (36.8)		
Number of chronic complications [n (%)]					
0	44 (75.9)	13 (59.1)	7 (36.8)	14.258	0.007
1	12 (20.7)	5 (22.7)	6 (31.6)		
≥ 2	2 (3.4)	4 (18.2)	6 (31.6)		
Duration of diabetes [n (%)]					
< 10 years	22 (37.9)	7 (30.4)	5 (26.3)	1.030	0.598
≥ 10 years	36 (62.1)	16 (69.6)	14 (73.7)		
A1C (%)*	7.46 ± 1.46	7.77 ± 0.85	8.56 ± 2.18	3.588	0.032
Blood pressure to target [n (%)]					
Yes	46 (83.6)	17 (85.0)	14 (77.8)	0.395	0.821
No	9 (16.4)	3 (15.0)	4 (22.2)		
Lipid profile to target [n (%)]					
Yes	14 (26.4)	8 (40.0)	5 (29.4)	1.280	0.527
No	39 (73.6)	12 (60.0)	12 (70.6)		

*A1C is presented as mean ± SD.

diagnosis of depression is considered morally unacceptable. Patients are consequently less likely to seek help for a psychological problem¹² or will somatize symptoms to lead to

the diagnosis of a more traditional physical illness. It is possible that, in this cultural setting, using a questionnaire format is less threatening and more likely to reveal patients'

true psychological status to facilitate access to care. This could have important implications for depression screening in the Chinese and indeed in other ethnic groups.

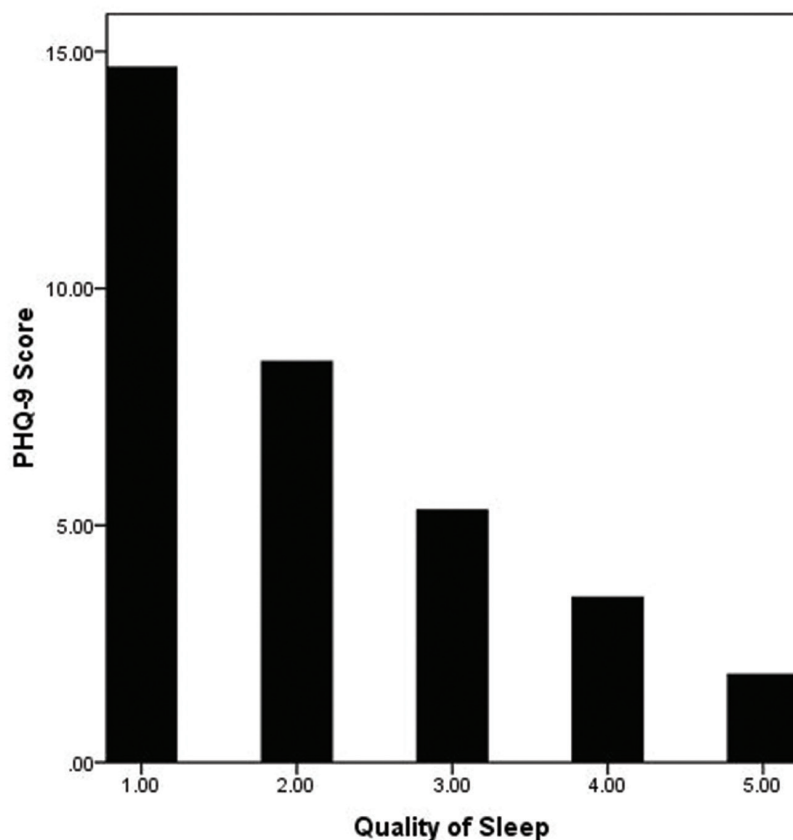


Figure 1. The relationship between quality of sleep and PHQ-9 score ($F = 15.431$, $P < 0.001$) (for quality of sleep, 1 = bad, 5 = excellent.) The bars in this figure show mean scores.

It is also of interest to note the strong relationship between the scores on quality of sleep and the likelihood of depression as determined by the PHQ-9. Apart from suggesting a close link between these parameters, whatever may be the underlying explanation, it might also suggest a pragmatic solution in that inquiring about the quality of sleep is the quickest way of rapidly screening for depression.

This study highlighted several related factors that may influence the development of depression. Factors such as older age at the time of immigration, shorter length of time since immigration, inability to speak English fluently, and greater proportion of time spent alone each day are different in the three groups with progressively higher PHQ-9 scores.

These items share a common thread of social isolation. For older people, with social values of their birth country implanted and a view of the world firmly entrenched, adapting to the culture of a new country would be more difficult than for younger people. Poor communication skills would make such an adaptive process even more difficult.¹³ Moreover, access to health care is also likely to be impaired.

Depression was also found to be dependent on several diabetes treatment and outcome variables. The presence and number of chronic complications with their implied morbidity and mortality would point in the direction of failure, helplessness, and hopelessness. Thus, it is not surprising that the presence of complications was associated with

questionnaire responses pointing in the direction of depression. The relationship between diabetes complications and depression can also be operative in the other direction. Depression in diabetes has been associated with poor self-management behaviors and poor medication adherence,^{14,15} both of which in turn aggravate glycemic control and increase the prevalence of complications in diabetes.^{16,17} To break the vicious circle of this complex bidirectional relationship between diabetes complications and depression, successful identification and treatment of depression is an important clinical initiative.

It is noteworthy that the impact of glycemic control as measured by A1C was relatively modest and not identified as an independent determinant. A1C results were retrieved from case notes, and many patients, especially the older ones, were oblivious to their results and did not factor them into their responses. Patients are also generally not symptomatic when exposed to the range of A1C usually encountered in Australia, and the association of poor glycemic control with the future development of complications is perhaps not one of immediate concern. By contrast, a history of hypoglycemia brings forth a memory of discomfort, anxiety, and lack of control and, therefore, features more prominently in the answers patients offered in the PHQ-9 questionnaire.

Associations of these various factors with the depression score do not establish a causal relationship. However, they are valuable clues to busy clinicians trying to identify susceptible individuals. Although the association of diabetes and depression leading to more complications has been described in previous studies and alluded to above, the alternative explanation that the coexistence of diabetes and its com-

plications leads to more depression is also possible.

There are several limitations to this study. First, the sample size was relatively small. However, the trend between PHQ-9 scores and various findings are quite clear-cut. Second, the number of patients with type 1 diabetes was relatively small, and all participants were from a single specialized outpatient clinic; therefore, the results should be interpreted accordingly. Third, the PHQ-9 response may be affected by symptoms of diabetes and imposition of its treatment and does not necessarily carry the same connotation of depression as in the general population. Finally, given that the information about coexisting chronic conditions was only collected at a clinical level and cannot be easily quantified, the effects of these conditions on the observed depression were not analyzed and should be tested in future studies.

In summary, approximately one-fifth of immigrant Chinese patients with diabetes in our study had symptoms consistent with moderate to severe depression. This is likely to be under-recognized in comparison to other ethnic groups with a more open attitude to psychological illness. Individuals who are socially isolated and have more complex treatment and complications of diabetes are particularly at risk. Health professionals caring for people with diabetes would be helped by bearing these points in mind.

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