

Geriatric Syndromes and Depressed Mood in Lower-income Singaporeans with Diabetes: Implications for Diabetes Management and Health Promotion

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Abstract

Introduction: This study aims to determine the association of geriatric syndromes and depressed mood among respondents with diabetes in a lower income community; and their association with self-management, lifestyle behaviour, and healthcare utilisation. This paper focuses primarily on the 114 respondents with diabetes aged 50+ to inform policy formulation at the community level. **Materials and Methods:** A pilot community health assessment was conducted in 4 blocks of 1- and 2-room apartments in Toa Payoh district from July to November 2009. Using a standard questionnaire, interviewers conducted face-to-face interviews with household members on chronic diseases, geriatric syndromes and health-related behaviour. Data were analysed using SPSSv15. **Results:** A total of 795 respondents were assessed with a response rate of 61.8%. Of 515 (64.8%) aged 50+ analysed in this study, 22.1% reported having diabetes, of whom 31.6% reported being depressed. Respondents with diabetes who reported being depressed had a higher prevalence of geriatric syndromes compared with those non-depressed; i.e. functional decline (30.6% vs 5.1%, $P < 0.001$); falls (33.3% vs 10.3%, $P = 0.003$); stumbling (30.6% vs 10.3%, $P = 0.007$); urinary incontinence (33.3% vs 5.1%, $P < 0.001$), progressive forgetfulness (27.8% vs 6.4%, $P = 0.002$) and poor eyesight (22.2% vs 6.4%, $P = 0.014$). They were less likely to comply with medications (86.1% vs 97.3%, $P = 0.026$) and performed exercise (13.9% vs 53.8%, $P < 0.001$). More had hospital admissions (13.9% vs 7.7%); and they had more outpatient visits per person (2.4 visits vs 0.9 visits, $P = 0.03$) at Specialist Outpatient Clinics. **Conclusion:** Geriatric syndromes were associated with the presence of depressed mood among persons with diabetes in the lower income group. As those with depressed mood had more unfavourable self-management and lifestyle behaviour, and utilise higher healthcare services, diabetes management must take these findings into consideration.

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Key words: Depressed mood, Diabetes mellitus, Geriatric syndromes, Low income

Introduction

The prevalence of diabetes mellitus (henceforth referred to as diabetes) has increased significantly in the last decade¹ and it is reaching epidemic levels worldwide due to ageing population, urbanisation, obesity and sedentary lifestyles.² In Singapore, the National Health Survey 2004 revealed that 8.2% of the population aged 18 to 69 years were inflicted with diabetes, and it was the 8th leading cause of death³ in 2004.

Depression has been shown in literature to play a part in the health status of those with diabetes. An overseas study reported that the impact of depression on functional

disabilities was significantly greater in people with diabetes than in those without.⁴ It is also associated with medication non-adherence, poor glycaemic control and unfavourable diabetes-related health behaviour,⁵⁻⁷ because it inhibits the adoption of effective self-management and favourable lifestyle behaviour such as physical activity and appropriate dietary behaviour through a decrease in social motivation.⁸

People with diabetes may also have other co-existing symptoms which require medical attention. Much of the literature^{5,9-11} reported that persons with diabetes have higher prevalence of geriatric syndromes, which could occur due to diabetic micro- and macro-vascular complications.^{12,13}

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Geriatric syndrome is a term that is commonly used to describe features of health conditions such as falls, frailty, dizziness, syncope, delirium and urinary incontinence in the elderly.^{9,12,14} Nevertheless, there is a lack of formal criteria to define geriatric syndromes, and hence its concept has remained ill-defined. Geriatric syndromes are multi-factorial and often share risk factors, such as old age, cognitive impairment, functional impairment and impaired mobility.⁹ They occur “when the accumulated effects of impairments in multiple systems render [an older] person vulnerable to situational challenges.”¹⁵ They lead to poor quality of life, reduced physical and social activities, and increased dependency on others. Hence geriatric syndromes in people with diabetes need special attention and should be part of treatment goals in diabetes management.

Singapore is one of the fastest ageing populations in Asia, the number of elderly residents (aged 65 years and above) made up 9.5% of the resident population in 2009,¹⁶ and it is expected to increase to 18.7% in 2030.¹⁷ If inflicted with diabetes, patients from the lower income group (monthly income below SGD\$2000), which constituted 39.5%¹⁸ of the resident population in 2005, will be predisposed to heavy health and financial burdens due to its chronic nature and complications. Studies have shown that prevalence of diabetes was up to 2 times higher among the lower income group compared to the wealthy population.^{19,20} It is therefore important to formulate policies and intervention on diabetes management and health promotion for the older persons among the lower income group.

Understanding the complex health issues of these economically under-privileged groups will help towards policy or intervention formulation. We conducted a pilot community health assessment on a purposive sample of lower income groups in 4 blocks of low-cost apartments (1- and 2-room public housing apartments) in Toa Payoh district, to gather information on their healthcare needs and health services utilisation. By targeting at the community level, we hope to develop interventions that could work effectively for the local community.

This study, which was part of the community health assessment, aims to determine (i) the association between geriatric syndromes and depressed mood among persons with diabetes residing in 1- and 2- room public housing apartments; (ii) the predictors associated with presence of depressed mood among those with diabetes; and (iii) the association between depressed mood and health-seeking behaviour and healthcare utilisation. This study examines only respondents aged 50 years and above, to maintain the relevance of findings for formulating interventions on diabetes management for those with both diabetes and geriatric syndromes.

Materials and Methods

Selection of the Four 1- and 2-room Apartments

There were a total of 316 blocks of 1- and 2-room public housing apartments in Singapore, of which 25 blocks were located in Toa Payoh district, housing 9.4% of all 1- and 2-room public housing apartment dwellers.²¹ Only residents with gross household income of below SGD\$2000 and SGD\$1500 per month were eligible to purchase and rent, respectively, 1- and 2-room public housing apartments. This dwelling type was selected for the community health assessment because low income had been shown to be associated with higher prevalence of chronic diseases.²²⁻²⁵ Toa Payoh district was chosen as it is a matured housing estate with larger volume of elderly population.²⁶ Using inpatient and primary care administrative databases, we selected for the community health assessment 4 blocks of 1- and 2-room public housing apartments located in Toa Payoh district that housed above average number of patients with the 8 selected chronic diseases of interest; i.e. hypertension, diabetes, hypercholesterolemia, heart disease, stroke, renal failure, asthma and chronic obstructive pulmonary diseases (COPD). This selected community of individuals was likely to require more health services than the general population, and therefore would be able to provide more insightful information for formulating policies on diabetes management.

Development of Questionnaire

The community health assessment questionnaire was developed by the Health Services and Outcomes Research Department from National Healthcare Group (NHG) with references to literature²⁷⁻²⁹ and inputs from stakeholders (administrators and geriatric physicians). Most questions were closed-ended, while some required verbatim responses. Face validity and cognitive testing of the questionnaire were carried out with 5 groups of participants comprising healthcare professionals and administrative staff working in NHG Headquarters via face-to-face interviews.

The developed questionnaire was in English language. It was then translated into Mandarin and Malay to cater to the needs of elderly residents who could only speak these languages. Forward translation from English to Mandarin and Malay, and the subsequent backward translation to English to minimise translation bias, were performed by independent translation professionals and assessed by bilingual experts. Questionnaires in 3 different languages were used for data collection.

Data Collection

The community health assessment was conducted from July to November 2009 in Toa Payoh housing estate. All

Singapore residents aged 18 years and above residing in the 4 selected blocks of apartments were eligible to participate. Those who were cognitively impaired or incoherent were represented by a proxy (main care-giver or parents).

A total of 27 interviewers were recruited to conduct face-to-face interviews. They were trained to administer the questionnaire using the same methodology to ensure standardisation in eliciting responses. Prior to the home visits, letters were sent to all the selected households informing them about the impending community health assessment, its purpose and seeking their cooperation and participation.

The 2-phased questionnaire consisted of a 'household' section and an 'individual' section. In the first phase, the representative of each household was approached to enumerate all eligible members living in the same household. For each eligible household member, the presence of hypertension, diabetes, hypercholesterolemia, heart disease, stroke, renal failure, asthma and COPD diagnosed by a western-trained doctor was recorded. In the second phase, demographic and socio-economic characteristics, information on self-reported chronic diseases self-management and healthcare utilisation, health-seeking behaviour, lifestyle behaviour in terms of exercise/walking, functional status, willingness to participate in health programmes were collected.

Validation

At the end of the community health assessment, validation check on the agreement rate of self-reported chronic diseases with the documented diagnosis in the administrative database obtained from Tan Tock Seng Hospital, National Healthcare Group Polyclinics and Institute of Mental Health was performed.

Data Analysis

The Statistical Packages for Social Sciences (SPSS) v15.0 was used for data analysis. Univariate analyses such as chi-square test and independent sample t-test were performed to identify differences between categorical groups and sample means respectively, where probability less than 0.05 was considered statistically significant. Stepwise logistic regression was used to predict independent variables associated with presence of depressed mood among respondents with diabetes.

Approval

An approval to conduct this community health assessment was obtained from the NHG Ethics Review Board (DSRB).

Results

Response Rate

A total of 931 dwelling units in the 4 blocks of apartments were allocated and visited by interviewers. Of these, 168 units were non-contactable after 3 visits and 39 houses were vacant. Of 724 households contacted, 166 refused to participate, giving a household response rate of 77.1%.

Of 991 eligible individuals identified, only 795 were assessed, as 87 residents were not contactable and 109 refused to participate, yielding an individual response rate of 80.2%. The overall response rate for the community health assessment was 61.8% [household response rate (77.1%) x individual response rate (80.2%) x 100%]. A total of 515 responses from respondents aged 50 years and above, which constituted 85.3% of all identified eligible individuals among the same age groups, were analysed in this study. Of the remaining 14.7% non-responders, 63.3% and 36.7% were male and female respectively.

Of 515 responses analysed, 114 (22.1%) had reported to have diabetes. On the validation check with hospital and clinic case-notes, an agreement rate of 84.5% with self-reported diabetes was achieved.

Demographic Characteristics of Respondents and Respondents with Diabetes

The socio-demographic characteristics of the community health assessment respondents were similar to that of the 1- and 2-room resident population in Singapore. However, when compared the socio-demographic profiles of respondents, those with diabetes and general Singapore residents aged 50 years and above^{16,18,30,31} (Tables 1 and 2), community health assessment respondents and those with diabetes were significantly older, with over 38.8% and 34.2% aged 70+ years, respectively, compared to 20.6% in the Singapore population. In the health assessment group, there were also a higher proportion of Malay ethnic groups, those without formal qualifications, and earning below SGD\$500 compared to the Singapore population.

Geriatric Syndromes among Respondents with and without Diabetes

Of all respondents, 82 (15.9%) required mobility aid; 72 (14.0%) had stumbled but did not fall; 69 (13.4%) had falls; 59 (11.5%) had hearing impairment; 58 (11.3%) had progressive forgetfulness; 49 (9.5%) had functional decline; 38 (7.4%) had eyesight problem, and 36 (7.0%) had urinary incontinence.

Respondents with diabetes were more likely to have geriatric syndromes compared to those without; i.e. a higher proportion reported lost control of urine and got wet (14.0% vs 5.0%, $P < 0.001$); and had difficulty performing

Table 1. Socio-demographic Characteristics of Respondents

Socio-demographic Characteristics	Singapore Residents† (Aged ≥50 Years)	All Respondents (n = 515)	
	%	No.	%
Gender			
Male	48.2	263	51.1
Female	51.8	252	48.9
Age Group (Years)			
50-59	51.8	160	31.1
60-69	27.6	155	30.1
70+	20.6	200	38.8
Ethnic Group			
Chinese	81.2	378	73.4
Malay	10.5	85	16.5
Indian	6.6	36	7.0
Others	1.6	16	3.1
Highest Education Level Attained			
No formal qualifications	38.0	311	60.4
Primary	29.5	148	28.7
Secondary	16.9	52	10.1
Junior college	6.1	3	0.6
Diploma and higher	9.6	1	0.2
Main Work Status over Past 12 Months			
Working full-time/part-time	-	178	34.6
Housewife/retiree	-	228	44.3
Unemployed	-	109	21.2
Average Monthly Personal Income Level‡			
<\$500	4.3	394	76.5
\$500-\$999	16.8	98	19.0
≥\$1,000	78.9	23	4.5

*Using chi-square test where $P < 0.05$ was considered significant.

†Source: Population Trends 2009, Singapore Department of Statistics; Year Book of Statistics Singapore, 2009, Singapore Department of Statistics; General Household Survey 2005 Statistical Release 1: Socio-Demographic and Economic Characteristics, Singapore Department of Statistics.

‡1. Included those with income only.

2. Personal income of respondents refers to salary/annuities/rental/investment returns/monetary allowances received; whilst those of Singapore residents refer to income from work.

Table 2. Socio-demographic Characteristics of Respondents with and without Diabetes

Socio-demographic Characteristics	All Respondents (n = 515)	Respondents Reported to Have Diabetes				
		Yes (n = 114)		No (n = 401)		P Value*
		No.	%	No.	%	
Gender						
Male	263	50	43.8	213	53.1	
Female	252	64	56.2	188	46.9	ns
Age Group (Years)						
50-59	160	26	22.8	134	33.4	
60-69	155	49	43.0	106	26.4	0.002
70+	200	39	34.2	161	40.1	
Ethnic Group						
Chinese	378	74	64.9	304	75.8	
Malay	85	20	17.5	65	16.2	0.007
Indian	36	16	14.0	20	5.0	
Others	16	4	3.5	12	3.0	
Highest Education Level Attained						
No formal qualifications	311	72	63.2	239	59.6	
Primary	148	33	28.9	115	28.7	ns
Secondary	52	9	7.9	43	10.7	
Junior college	3	0	0	3	0.7	
Diploma and higher	1	0	0	1	0.2	
Main Work Status over Past 12 Months						
Working full-time/part-time	178	26	22.8	152	37.9	0.003
Housewife/retiree	228	54	47.4	174	43.4	
Unemployed	109	34	29.8	75	18.7	
Average Monthly Personal Income Level**						
<\$500	394	98	86.0	296	73.8	
\$500-\$999	98	15	13.2	83	20.7	0.035
≥\$1,000	23	1	0.9	22	5.5	

*Using chi-square test where $P < 0.05$ was considered significant.

**1. Included those with income only.

2. Personal income of respondents refers to salary/annuities/rental/investment returns/monetary allowances received; whilst those of Singapore residents refer to income from work.

Table 3. Geriatric Syndromes and Coping with Activities of Daily Living among Respondents with Diabetes

Description	Respondents Reported to Have Diabetes					Respondents with Reported Diabetes and Depressed Mood				
	Yes[a] (n = 114)		No[b] (n = 401)		P Value* [a] vs [b]	Yes[c] (n = 36)		No[d] (n = 78)		P Value* [c] vs [d]
	No.	%	No.	%		No.	%	No.	%	
Do you have any recent functional decline in the past 12 months? (yes)	15	13.2	34	8.5	ns	11	30.6	4	5.1	<0.001
Geriatric Syndrome										
What is your ambulatory status? - Require assistance or non-ambulant (yes)	19	16.7	29	7.2	0.005	11	30.6	8	10.3	0.011
Require mobility aid (yes)	28	24.6	54	13.5	0.024	18	50.0	10	12.8	<0.001
In the past 12 months, have you fallen to the ground or fallen and hit something like a chair or the stairs? (yes)	20	17.5	49	12.2	ns	12	33.3	8	10.3	0.003
In the past 12 months, have you stumbled or lost your balance, but did not actually fall to the ground? (yes)	19	16.7	53	13.2	ns	11	30.6	8	10.3	0.007
In the past 12 months, have you ever lost control of urine and got wet? (yes)	16	14.0	20	5.0	<0.001	12	33.3	4	5.1	<0.001
Has there been any progressive forgetfulness? (yes)	15	13.2	43	10.7	ns	10	27.8	5	6.4	0.002
Do you often cough/choke on food/liquid? (yes)	2	1.8	10	2.5	ns	1	2.8	1	1.3	ns
Do you have difficulty doing any of your daily activities because of your eyesight, even while wearing glasses? (yes)	13	11.4	25	6.2	0.038	8	22.2	5	6.4	0.014
Do you have difficulty hearing? (yes)	11	9.6	48	12.0	ns	5	13.9	6	7.7	ns
Activities of Daily Living (ADL)										
Are you able to perform the following basic ADL independently?										
- Feeding (yes)	112	98.2	400	99.8	ns	35	97.2	77	98.7	ns
- Transferring (yes)	111	97.4	397	99.1	ns	35	97.2	76	97.4	ns
- Toileting (yes)	109	95.6	396	98.8	0.033	33	91.7	76	97.4	ns
- Dressing/undressing (yes)	109	95.6	398	99.3	0.006	34	94.4	75	96.2	ns
- Bathing (yes)	108	94.7	395	98.5	0.019	33	91.7	75	96.2	ns
Are you able to perform the following instrumental ADL independently?										
- Using telephone (yes)	106	93.0	392	97.8	0.012	32	88.9	74	94.9	ns
- Travelling (public transport) (yes)	90	78.9	361	90.0	0.002	24	66.7	66	84.6	0.029
- Shop for groceries (yes)	94	82.5	366	91.3	0.008	25	69.4	69	88.5	0.013
- Preparing meals (yes)	97	85.1	378	94.3	0.001	27	75.0	70	89.7	0.040
- Do housework (yes)	94	82.5	372	92.8	0.001	24	66.7	70	89.7	0.003
- Taking medicine (yes)	102	89.5	391	97.5	<0.001	30	83.3	72	92.3	ns
- Managing money (yes)	105	92.1	391	97.5	0.007	31	86.1	74	94.9	ns

*Using chi-square test where $P < 0.05$ was considered significant.

daily activities due to poor eyesight (11.4% vs 6.2%, $P = 0.038$). A significantly higher proportion of respondents with diabetes either required assistance or were non-ambulant (chair or bed-bound) (16.7% vs 7.2%, $P = 0.005$); and required mobility aids such as walking stick, quad stick and walking frame (24.6% vs 13.5%, $P = 0.024$). Respondents without diabetes were better equipped to cope with activities of daily living compared to those with diabetes (Table 3).

Respondents with Diabetes and Depressed Mood

1. Prevalence of Depressed Mood

Of all respondents with diabetes ($n = 114$), 31.6% reported being depressed, significantly higher than 18.2% among those without diabetes ($P = 0.001$). Factors such as duration of diabetes (i.e. years since diagnosed), diabetes treatment modality (whether on insulin; setting of the most frequently visited provider), presence of comorbidities/complications (i.e. hypertension, hypercholesterolemia, heart disease, stroke, renal failure), and demographic profiles between those with and without depressed mood were found to be statistically insignificant. However, those with hypercholesterolemia, those on insulin, those diagnosed with diabetes more than 5 years ago, those aged between 50 and 59 years, Indian and other ethnic groups, those whose main language medium was English, those unemployed, housewife or retiree, and those with income below SGD\$500 had relatively higher prevalence of depressed mood.

2. Depressed Mood, Geriatric Syndromes and Activities of Daily Living

Depressed mood among respondents with diabetes was significantly associated with a higher prevalence of geriatric syndromes compared to those without; i.e. experienced functional decline (30.6% vs 5.1%, $P < 0.001$), had a fall (33.3% vs 10.3%, $P = 0.003$), stumbled (30.6% vs 10.3%, $P = 0.007$) and reported urinary incontinence in the preceding 12 months (33.3% vs 5.1%, $P < 0.001$); also had progressive forgetfulness (27.8% vs 6.4%, $P = 0.002$) and poor eyesight (22.2% vs 6.4%, $P = 0.014$). They were also more likely to either require assistance or were non-ambulant compared with non-depressed counterparts (30.6% vs 10.3%, $P = 0.011$); and required mobility aid (50.0% vs 12.8%, $P < 0.001$) (Table 3). However, there was no difference in the ability to perform basic ADL between depressed and non-depressed diabetes respondents.

In the logistic regression to predict the independent factors associated with presence of depressed mood among respondents with diabetes, factors considered were socio-demographic profiles, duration of diabetes, diabetes treatment modality, presence of comorbidities/complications, presence of geriatric syndromes, and ability

to independently perform basic ADL and instrumental ADL. Factors that were identified in the univariate analysis as significant at $P < 0.15$ were used in the logistic regression model. These included (i) presence of geriatric syndromes (functional decline, non-independent ambulatory status, need for mobility aid, fall, stumble, urinary incontinence, progressive forgetfulness and visual impairment), and (ii) inability to independently perform instrumental ADL (travelling, shop for groceries, preparing meals, do housework). $P < 0.15$ was used as an inclusion criteria, instead of $P < 0.05$, in order not to miss out potential significant factors as a result of the relatively small sample. The presence of urinary incontinence (adjusted OR 5.9, 95% CI, 1.5 to 22.5) and progressive forgetfulness (adjusted OR 5.6, 95% CI, 1.5 to 20.6), and the need for mobility aid (adjusted OR 5.5, 95% CI 2.0 to 15.4) were identified as independent factors significantly associated with presence of depressed mood among respondents with diabetes (Table 4).

3. Health Seeking Behaviour and Perception on Current Health Status

Literature⁸ had shown that depression could hinder the adoption of self-management and favourable lifestyle behaviour due to poor social motivation. Table 5 shows that depressed respondents with diabetes are less likely to comply with medications as instructed (86.1% vs 97.3%, $P = 0.026$), perform exercise (13.9% vs 53.8%, $P < 0.001$), adopt dietary control (47.2% vs 65.4%), or walk a minimum of 10 minutes to another place (61.1% vs 85.9%, $P = 0.003$). They also had poorer sense of well-being and

Table 4. Independent Factors Significantly* Associated with Presence of Depressed Mood among Respondents with Diabetes

Factor		Respondents with Reported Diabetes and Depressed Mood	
		OR	95% CI
Presence of Geriatric Syndrome			
Urinary incontinence	Yes	5.9	1.5-22.5
	[No]		
Progressive forgetfulness	Yes	5.6	1.5-20.6
	[No]		
Requiring mobility aid	Yes	5.5	2.0-15.4
	[No]		

* $P < 0.05$ by stepwise logistic regression analysis.

[] depicts reference group; OR, odds ratio; CI, confidence interval
Odds ratio adjusted for (a) presence of geriatric syndromes (functional decline, non-independent ambulatory status, need for mobility aid, fall, stumble, urinary incontinence, progressive forgetfulness and visual impairment), and (b) inability to independently perform instrumental ADL (travelling, shop for groceries, preparing meals, do housework).

Table 5. Self-management, Lifestyle Behaviour and Perception on Health Status of Respondents with Diabetes

Description	Respondents with Diabetes						<i>P</i> Value* [a] vs [b]
	With Depressed Mood (n = 36)[a]		Without Depressed Mood (n = 78) [b]		Total (n = 114)		
	No.	%	No.	%	No.	%	
Self Management of Diabetes and Lifestyle Behaviour							
Are you taking your western medications as instructed? (yes)	31	86.1	71	97.3#	102	93.6	0.026
What else are you currently doing to manage your condition?							
- Nothing (yes)	18	50.0	17	21.8	35	30.7	0.002
- Exercise (yes)	5	13.9	42	53.8	47	41.2	<0.001
- Dietary control (yes)	17	47.2	51	65.4	68	59.6	ns
How often do you exercise? (regularly or occasionally)	5	13.9	33	42.3	38	33.3	0.018
Do you walk for at least 10 minutes continuously to travel from one place to another? (yes)	22	61.1	67	85.9	89	78.1	0.003
Perception on Current Health Status¶							
Average rating of current state of health		5.69		6.97		6.6	<0.001

*Using chi-square test where $P < 0.05$ was considered significant.

#Of 78 respondents, only 73 were prescribed with western medications.

|| More than 1 answer is allowed (except for answer option 'Nothing').

¶1. Rate was from 0 to 10, where 0 is worst possible and 10 is best possible.

2. Using independent samples t-test where $P < 0.05$ was considered significant.

rated their current health status (from 0 to 10 where 0 is worst possible and 10 is best possible) significantly lower than those without depressed mood (mean score 5.69 vs 6.97, $P < 0.001$).

4. Healthcare Utilisation

Table 6 shows that more depressed respondents (13.9% vs 7.7%) had utilised inpatient care compared to those without depressed mood. They also had higher utilisation on specialist outpatient care in terms of average visits per respondents (2.4 visits vs 0.9 visits, $P = 0.03$).

5. Economic Status of and Assistance Required

A significantly higher proportion of those depressed respondents were without personal monthly income (86.1% vs 71.8%), and required financial assistance (77.8% vs 53.8%, $P = 0.015$) to cope with their medical condition.

Discussion

Our study found that respondents with diabetes and low income were more likely to have geriatric syndromes than those without, and geriatric syndromes were more prevalent among those depressed. Those with depressed mood had more unfavourable self-management and lifestyle behaviour, had lower sense of well-being and incurred higher healthcare utilisation. Most of them were without personal income and required financial assistance for their conditions.

To date, there is no general concurrence on the age at which a person could be considered "geriatric". Most of the developed countries used chronological age of 60 or 65 years, which were comparable to retirement ages, as a definition of elderly. However, a cut-off of 50 years old to study geriatric syndromes in this paper was used instead in consideration of a study³² finding showing that the prevalence of geriatric conditions between those with and without diabetes was most marked in middle-age. Essentially, there is no general agreement on the age at which a person becomes old, and it is generally accepted that biological age and old age are not necessarily synonymous.

It is also noteworthy that as multiple eligible members of a household were included in this analysis, there could be confounding effect due to clustering by household membership. To determine the functional status and prevalence of geriatric syndromes in these 1 to 2-room public housing apartments, all eligible respondents were considered, as we believed that the confounding effect of household membership clustering was unlikely to affect these variables, which were more objective. However, we acknowledged that it could affect variables that were related to respondents' self-management, lifestyle behaviours and perception (Tables 4 and 5). Nonetheless, this confounding effect would be minimal as among the 114 respondents with diabetes in Tables 4 and 5, there were only 4 respondents (3.5%) who came from the same households, and could be unrelated and without familial ties with the other household member.

Table 6. Healthcare Utilisation of Respondents with Diabetes

Description	Respondents with Diabetes						<i>P</i> Value* [a] vs [b]
	With Depressed Mood (n = 36)[a]		Without Depressed Mood (n = 78)[b]		Total (n = 114)		
	No.	%	No.	%	No.	%	
Inpatient Care Utilisation							
How many times were you admitted to a hospital because of the condition in the past 12 months? (at least once)	5	13.9	6	7.7	11	9.6	ns
	Total Visits	Average No. of Episodes/ Visits Per Respondent[c]	Total Visits	Average No. of Episodes/ Visits Per Respondent[d]	Total Visits	Average No. of Episodes/ Visits Per Respondent	<i>P</i> Value¶ [c] vs [d]
Outpatient Care Utilisation							
How many times have you sought treatment at the following in the past 12 months?							
- Private GP	37	1.0	51	0.7	88	0.8	ns
- Polyclinic	67	1.9	232	3.0	299	2.6	ns
- Specialist outpatient clinic	85	2.4	70	0.9	155	1.4	0.03
- Emergency department	1	0.3	1	0.0	2	0.0	ns

*Using chi-square test where $P < 0.05$ was considered significant.¶Using independent samples t-test where $P < 0.05$ was considered significant.

The main focus of this study was to determine the association between geriatric syndromes and depressed mood among respondents with diabetes in a lower income community. Although diabetes could be an effect modifier for certain geriatric syndromes, self-management and lifestyle behaviours, it is beyond the scope of this study to explore in detail the association of geriatric syndromes and depressed mood among respondents without diabetes.

While this study focused on the physical and functional aspects, future studies should include cognitive and nutritional aspects for a comprehensive assessment of geriatric syndromes. Nevertheless, it has uncovered significant findings that have important implications on diabetes management and health promotion.

Diabetes and Geriatric Syndromes

This study has shown a higher prevalence of geriatric syndromes such as falls, urinary incontinence, visual

impairment and reduced physical ability among respondents with diabetes compared to those without diabetes. Our findings were similar to those in the literature, which reported that diabetes is one of the major predictors of the risk of falling,^{10,33} its association with urinary incontinence,^{11,34} ocular complications such as cataract³⁵ and retinopathy,³⁶ basic ADL disabilities and walking limitation.³⁷ As they can adversely affect successful diabetes management,¹⁴ it is essential to assess geriatric syndromes and incorporate them as part of the treatment goals in diabetes management.

Geriatric Syndromes and Depressed Mood

Significantly more depressed diabetes respondents had geriatric syndromes and less of them could perform selected instrumental ADL independently. This is consistent with a study which found that depression⁵ increases the incidence of micro and macro-vascular complications and reduced ADL abilities in the elderly with diabetes, and it was

associated with urinary incontinence, visual impairment and poorer perceived health status. As depression affecting micro and macro-vascular complications also forms a vicious cycle leading to increased mortality,¹² psychological interventions should be part of the care in diabetes patients to prevent vascular complications and aggravation of geriatric syndromes. Target groups should include those with urinary incontinence, progressive forgetfulness and those who required mobility aid.

Depressed Mood and Self-management and Lifestyle Behaviour

The association of depressed mood with unfavourable health seeking and lifestyle behaviour is consistent with overseas findings that depression impedes the adoption of effective self-management and favourable lifestyle behaviour through a decrease in social motivation.⁸ It is therefore important to prevent the worsening of physical disabilities by encouraging exercise therapy such as muscle strengthening and balance retraining, and Tai Chi group exercise³⁸ among diabetes patients. The complex interplay between depression and motivation on behavioural change must be noted in future health promotion efforts on patient empowerment for favourable self-management and lifestyle behaviour. Psychological function is an important dimension that should be addressed to complement the health promotion efforts on improving lifestyle behaviour and secondary prevention of complications for people with diabetes.

Limitations

There were several limitations. This was a cross-sectional study and was unable to show the temporal relationship between diabetes, depressed mood, geriatric syndromes and lifestyle habits among respondents. Respondents with diabetes were considered “depressed” if they “often felt sad or depressed”, though not diagnosed by a doctor. The findings of this community health assessment had limited generalisability to the population from 1- and 2-room apartments beyond the Toa Payoh district within which the data were collected.

Conclusion

Despite the limitations, the study has uncovered new and important local knowledge that serves as groundwork for future efforts on diabetes management and health promotion for more holistic care of our diabetes patients in the local community. A larger-scale community health assessment that extends into other geographical areas could be undertaken in future to further validate findings of this pilot study. The interventions, if proven to be effective, could be applied to similar sub-populations residing in areas beyond Toa Payoh district.

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