

Screening for Drinking Problems in the Elderly in Singapore Using the CAGE Questionnaire

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Abstract

Introduction: Given that past research on drinking problems has focused primarily on younger samples, the present study sought to examine the prevalence and correlates of alcohol use among the elderly in Singapore. **Materials and Methods:** Data were extracted from the Well-being of the Singapore Elderly (WiSE) study, a cross-sectional, epidemiological survey conducted among a nationally representative sample of Singapore residents (n = 2565) aged 60 years and above. Variables assessed include drinking problems, depression and anxiety symptoms, obesity, smoking status, chronic physical disorders and disability. **Results:** The weighted prevalence of drinking problems (CAGE score ≥ 2) in our sample was 4.2%. Male sex, Indian ethnicity, and being divorced or separated were associated with a significantly higher likelihood of drinking problems. Participants with drinking problems were also more likely to have subthreshold depression. There were no significant differences in disability among those with drinking problems, those without drinking problems and non-drinkers, after adjusting for demographic variables. **Conclusion:** Our findings contribute to the body of research that indicates an association between drinking problems and depressive symptoms among the elderly. Thus, screening for depressive symptoms in the elderly with drinking problems may be useful in identifying such comorbidities in order to aid treatment planning.

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Introduction

Alcohol use disorders (AUDs) can be defined as a maladaptive pattern of alcohol use that causes clinically significant impairment or distress.¹ Studies on alcohol consumption have focused mainly on the young and middle-aged, but less on older adults. However, given the rise in prevalence of alcohol problems among older adults aged 65 and over, and evidence indicating that this trend will continue,² it is important to investigate alcohol use in the elderly as well. Caputo et al³ reported that approximately 50% of adults over 65 years of age and 25% of those aged over 85 regularly consumed alcohol. These figures are expected to rise dramatically⁴ due to increasing life expectancy, which allows individuals to live and work longer, thus increasing their access to disposable income.⁵

Moreover, the increasingly permissive attitude towards alcohol use⁵⁻⁷ and its ease of availability in society^{4,8} suggest that alcohol use and abuse among the elderly will become a growing area of concern.³ Recent prevalence estimates of problematic alcohol use, which includes heavy drinking (defined as drinking 5 or more drinks on 1 occasion on each of 5 or more days in the past 30 days) and binge drinking (defined as drinking 5 or more alcoholic drinks on 1 occasion on at least 1 day in the past 30 days),^{9,10} among older adults have been found to range between 1% and 15%.^{11,12}

Excessive alcohol use has been established as a major contributor of disability and mortality across all age groups.¹³ According to the World Health Organization (WHO) global status report on alcohol and health, alcohol consumption accounted for 5.9% of all deaths in 2012

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and 5.1% of the global burden of disease and injury.¹⁴ The elderly may be more vulnerable to the effects of excessive alcohol use due to their compromised ability to metabolise alcohol, exacerbating the associated health risk at any given level of use.^{8,15-17} Furthermore, complications due to co-existing disabilities¹⁶ and the similarity between symptoms of excessive alcohol use and those of normal ageing, such as memory difficulties,¹⁸ pose unique problems in identifying and treating this condition among older adults. Epidemiological studies in Singapore, for instance, have found alcohol use problems, including heavy drinking and AUDs, to be associated with other mental and physical conditions (e.g. major depressive disorder, chronic pain) as well as decreased quality of life.^{19,20}

Several demographic variables have been implicated as risk factors for drinking problems in the elderly. For example, males, younger age, being divorced, separated, or single, higher education, and higher income have all been associated with increased odds of unhealthy drinking.^{5, 11,15,17,18,21}

There also appears to be an association between depression and excessive alcohol use among older adults.²² Almost 20% of individuals aged 65 and over with a diagnosis of depression have a co-occurring AUD.³ In addition, Kirchner et al²³ found that heavy drinking alone and heavy drinking combined with binge drinking were linked to depressive symptoms among individuals aged 65 to 103 years in a primary care setting. The tendency to use alcohol as a form of self-medication^{5, 17} appears to largely account for the relationship between these 2 variables. On the other hand, the presence of chronic diseases has been associated with alcohol abstinence,²⁴ likely due to the risk of potential drug-alcohol interactions.^{16,24}

A review on alcohol use among the elderly by Reid et al²⁵ yielded mixed evidence on the relationship between alcohol use and disability. For instance, the percentage of studies demonstrating harm, no association, or benefit of alcohol use with respect to functional disability was 38%, 46% and 16%, respectively. Some evidence even indicated that moderate alcohol use has a protective effect against age-related functional decline.^{26,27}

Previous research on alcohol use in Singapore used data from the Singapore Mental Health Survey (SMHS), a national survey of mental disorders conducted among residents aged 18 years and above.^{19,20,28} As such, alcohol use among older adults was not examined in-depth in these studies. Yet, the greater sensitivity to alcohol, increased health problems and increased use of medication that may react negatively with alcohol among the elderly¹⁰ meant that results gleaned from adult studies may not replicate in an elderly sample. Furthermore, past studies have found

some evidence for ethnic and cultural differences in alcohol use.²⁹ In a review examining drinking patterns among the different ethnicities in the United Kingdom (UK), most ethnic minority groups (i.e. Black, Caribbean, Indian, Pakistani, Bangladeshi and Chinese) were found to have lower levels of drinking and higher rates of abstinence compared to individuals from White backgrounds.³⁰ Given the potentially high-risk outcomes associated with alcohol use among older adults, lack of clarity of evidence pertaining to disability and alcohol use, ethnic differences in drinking patterns, and scant cross-cultural research, this current study examines the prevalence and correlates of alcohol use among elderly residents in Singapore. By identifying factors associated with drinking problems among the elderly in Singapore, our findings might have implications for the future planning of public health campaigns and policies that aim to prevent excessive alcohol use in at-risk individuals as well as curb drinking problems in vulnerable populations.

Materials and Methods

Setting

Data were extracted from the Well-being of the Singapore Elderly (WiSE) study, a cross-sectional epidemiological survey conducted on a nationally representative sample of Singapore residents aged 60 years and above. Singapore is a multiethnic country in Southeast Asia with a population of 5 million, of which, 74.2% are Chinese, 13.3% are Malay, 9.1% are Indian and 3.3% belong to other ethnic groups.³¹ The 4 official languages in Singapore are English, Mandarin, Malay and Tamil, though a small proportion of the population also speak other languages and dialects such as Hokkien, Cantonese and Teochew.

Sample

Participants were randomly selected from a national database of Singapore residents and disproportionate stratified sampling was used to ensure the inclusion of equivalent proportions of the 3 main ethnic groups in Singapore (Chinese, Malay and Indian). Individuals residing in day care centres, or nursing homes at the time of the study were included in the sample, though residents who were living outside the country or were unable to be located due to incomplete or incorrect addresses were excluded. The study was approved by the relevant ethics committees (National Healthcare Group, Domain Specific Review Board and the SingHealth Centralised Institutional Review Board). Participants or their legally acceptable representatives (if participants were unable to provide written informed consent) provided written informed consent before study participation.

Data Collection

As part of the WiSE study, trained lay interviewers conducted face-to-face household interviews with Singapore residents who were at least 60 years of age between October 2012 and December 2013. Each interview lasted 2 to 3 hours, and was conducted in English, Mandarin, Malay, Tamil, or any of the 3 major Chinese dialects in Singapore (i.e. Hokkien, Cantonese or Teochew). More details on the WiSE methodology can be found in a separate paper.³²

Measures

Demographic Information

A structured interview was used to obtain participants' demographic information, including age, sex, ethnicity, marital status, level of education, and employment status.

Alcohol Use

The CAGE questionnaire³³ is a 4-item “yes/no” screening tool used to assess lifetime self-reported problems related to alcohol use in the present sample. The 4 items were prefaced by a screening question, “Was there ever a period in your life when you drank at least 12 drinks in a year?” (a drink was defined as “a glass of wine, a can/bottle of beer, or a shot/jigger of liquor either alone or in a mixed drink”). Participants who indicated they had never drunk alcoholic drinks or drank less than 12 drinks per year were directed to skip the next 4 items. Those who answered “yes” to the screening question were asked about 4 aspects of their drinking habits: 1) feeling that they should cut down on their drinking; 2) being annoyed about criticism of their drinking; 3) feeling bad or guilty about their drinking; and 4) having a drink first thing in the morning to steady their nerves or to get rid of a hangover (eye opener). Consistent with prior studies,³⁴⁻³⁷ lifetime drinking problems were defined as a CAGE score of 2 or greater (i.e. endorsing at least 2 of the 4 aspects of the drinking problems listed above). The questionnaire has demonstrated high test-retest reliability and adequate convergent validity,³⁸ and has been previously used in samples of older adults.^{36,37}

Depression and Anxiety

Symptoms of depression and anxiety were evaluated using the Geriatric Mental State (GMS) examination and its associated diagnostic algorithm, the Automated Geriatric Examination for Computer Assisted Taxonomy (AGECAT).^{39,40} The GMS is a structured mental health assessment tool designed for use in older samples that has been used in numerous international studies and has shown robust reliability and validity.^{39,40} It has also been validated for use in the current sample in a previous paper.³² The interview focuses on psychiatric symptoms within the past

1 month. The GMS-AGECAT was used in the present study to determine the severity of depression and anxiety. Each syndrome was given a diagnostic confidence level, ranging from 0 (no symptoms) to 5 (very severely affected); level 3 and greater denoted case-level severity, whereas levels 1 and 2 represented subthreshold-level severity. Given that prior research has indicated that depression occurs along a continuum, and that depression and subthreshold depression have similar correlates (e.g. impairment in physical functioning, disability days),^{41,42} we combined the latter 2 categories and produced 2 subgroups—“no depression” and “at least subthreshold depression.”

Obesity

Obesity was determined by using participants' body mass index (BMI) (kg/m²) calculated from their height and weight, which were measured using a tape measure attached to the wall and a digital standing scale, respectively. The cutoff score used was based on WHO guidelines, which define obesity as BMI greater than or equal to 30.⁴³

Smoking

Lifetime smoking status was determined by those participants who answered “yes” to the question: “Has there ever been a period when you smoked cigarettes, cigars, a pipe, chewing tobacco, beedi (a type of Indian cigarette), or snuff nearly every day?” Participants who gave a negative response were considered as “non-smokers.”

Chronic Physical Disorders

Chronic physical conditions were evaluated using a checklist. Participants were asked if they had ever experienced or had been told by a doctor that they had any of the following conditions: 1) hypertension; 2) heart trouble (including heart attack, angina, heart failure, valve disease, and other related conditions); 3) stroke; 4) transient ischaemic attacks (TIAs); and 5) diabetes.

Disability

Disability was assessed using the World Mental Health (WMH) Survey version of the WHO Disability Assessment Schedule II (WHODAS II).⁴⁴ The modified WHODAS II evaluates 5 domains of functioning: understanding and communicating, self-care, getting around, getting along with others, and life activities. Each of the first 4 domains was prefaced by a filter question, followed by specific items that yielded severity ratings as well as a question on the number of days in the last month that the respondent had experienced an impairment in functioning. The scale has demonstrated acceptable levels of internal consistency and validity.⁴⁴

Table 1. Demographic Profile of Sample

	Overall Sample (n = 2565)			Drinking Problems (CAGE Score ≥2) (n = 101)			Drinking Problems (CAGE Score ≥1) (n = 218)		
	Frequency	Unweighted (%)	Weighted (%)	Frequency	(%) [†]	Row (%) [†]	Frequency	(%) [†]	Row (%) [†]
Age group									
60 – 74	1494	58.25	75.01	77	3.50	4.67	155	8.34	11.12
75 – 84	669	26.08	19.46	17	0.59	3.03	47	1.58	8.11
85+	402	15.67	5.53	7	0.07	1.25	16	0.21	3.85
Sex									
Female	1448	56.45	55.91	6	0.45	0.81	12	1.01	1.80
Male	1117	43.55	44.09	95	3.71	8.41	206	9.13	20.70
Ethnicity									
Chinese	1012	39.45	83.30	37	3.39	4.07	96	8.71	10.45
Malay	745	29.04	9.28	24	0.31	3.30	41	0.54	5.86
Indian	772	30.10	5.98	38	0.39	6.44	77	0.73	12.29
Others	36	1.40	1.44	2	0.08	5.76	4	0.15	10.13
Marital status									
Married/cohabiting	1484	57.90	64.01	73	2.88	4.50	158	7.11	11.11
Never married	136	5.31	7.95	7	0.41	5.11	17	1.27	15.96
Widowed	836	32.62	22.51	10	0.35	1.56	27	0.90	3.98
Divorced/separated	107	4.17	5.53	11	0.53	9.61	16	0.87	15.76
Education									
None	511	20.04	16.45	6	0.36	2.17	16	0.78	4.73
Some, but did not complete primary	620	24.31	23.94	22	0.99	4.16	53	2.95	12.34
Completed primary	640	25.10	24.83	32	1.26	5.09	67	2.94	11.85
Completed secondary	517	20.27	22.37	26	1.01	4.52	51	2.39	10.67
Completed tertiary	262	10.27	12.41	15	0.55	4.40	30	1.07	8.63
Employment status									
Paid work (part-time and full-time)	688	27.15	33.88	54	1.86	5.49	102	4.54	13.41
Unemployed	32	1.26	1.54	3	0.09	5.56	7	0.41	26.70
Homemaker	808	31.89	26.26	4	0.34	1.29	7	0.67	2.56
Retired	1006	39.70	38.32	39	1.81	4.73	100	4.40	11.49

[†]Using weighted data.

[†]Calculated within each subgroup. For example, 4.67% of participants aged between 60 and 74 years reported drinking problems.

Statistical Analysis

To ensure that the survey findings were representative of the Singapore elderly population, the data were weighted and analysed using survey data analysis procedures implemented in SAS version 9.3. The purpose of weighting the WiSE data was to compensate for oversampling, non-coverage, non-response and post-stratification, thereby making the weighted data representative of the population of inference as closely as possible.⁴⁵ Means and standard deviations (SD) were calculated for continuous variables, whereas frequencies and percentages were calculated for categorical variables. Multiple logistic regression analysis was performed to examine the demographic correlates of drinking problems as well as how drinking problems is linked to other health conditions with adjustment for demographic variables (age, sex, ethnicity, marital status, level of education and employment status). To investigate the relationship between alcohol use and disability, we regressed alcohol consumption patterns on disability, controlling for the same demographic variables. For analyses on disability, participants were divided into 3 groups based on their consumption patterns: 1) has never drunk at least 12 drinks in a year (“non-drinkers”); 2) has drunk at least 12 drinks in a year before but no lifetime drinking problems (“those without drinking problems”); and 3) has drunk at least 12 drinks in a year before with lifetime drinking problems (“those with drinking problems”). Standard errors (SE) and significance tests for survey data analysis procedures were estimated using the Taylor series’ linearisation method to adjust for the weighting. Multivariate significance was evaluated using Wald X^2 tests based on design corrected coefficient variance-covariance matrices. Statistical significance was set at the conventional level of $P < 0.05$, using two-sided tests.

Results

Sample Description

A total of 2565 participants were recruited for the present study. The mean age of the sample was 72.7 years (range, 60 to 105 years). The majority of the sample was female (56.5%), Chinese (39.5%), married/cohabiting (57.9%), and retired (39.7%). About a quarter of the sample completed primary education (Table 1). The study response rate was 66%. Relative to responders, non-responders were less likely to be in the older age group (85+ years old vs 60 to 74 years old; OR: 0.7; 95% CI, 0.6, 0.8) and more likely to be of Malay (OR: 2.9; 95% CI, 2.4, 3.4) or Indian ethnicity (OR: 2.3; 95% CI, 2.0, 2.7).

Prevalence

Based on a CAGE cutoff score of 2, 4.2% of our overall

sample reported drinking problems. The unweighted prevalence was 3.9%. The prevalence of drinking problems in the subgroup of participants who had ever drunk at least 12 drinks in a year was 18.5%. Table 1 provides a breakdown of the prevalence estimates of drinking problems by demographic variables.

Demographic Correlates

Being male (OR: 26.9; 95% CI, 4.5, 160.8), Indian (OR: 1.8; 95% CI, 1.1, 3.0), or divorced/separated (OR: 2.9; 95% CI, 1.1, 7.6) was significantly associated with drinking problems (Table 2). Specifically, men were more likely than women, Indians were more likely than Chinese, and divorced/separated participants were more likely than married participants to report drinking problems.

Drinking Problems and Other Conditions

In subsequent logistic regression analyses, we examined the relationship between drinking problems and other conditions (e.g. depression, anxiety, obesity, and hypertension), adjusting for age, sex, ethnicity, marital status, level of education, and employment status. Participants with drinking problems were more likely to have at least subthreshold depression within the past 1 month than participants without drinking problems (OR: 2.7; 95% CI, 1.3, 5.4). However, drinking problems was not significantly associated with general anxiety within the past month, obesity, smoking, hypertension, stroke, transient ischaemic attacks (TIAs), heart problems, or diabetes (Table 3).

Alcohol Use and Disability

Those with drinking problems (mean: 9.6, SE: 2.7) reported significantly greater disability than those without drinking problems (mean: 6.2, SE: 0.9, $P < 0.001$), though there was no significant difference in disability between those with drinking problems and non-drinkers (mean: 12.1, SE: 0.5, $P > 0.05$). The difference in disability between those with drinking problems and those without drinking problems was no longer significant after controlling for age, sex, ethnicity, marital status, level of education, and employment status.

Comparison of CAGE Scores

Given the low prevalence of drinking problems in our study population, the decision was made to conduct additional analysis to examine the prevalence and correlates of drinking problems using a lower cutoff score (CAGE score ≥ 1).⁴⁶ In using a CAGE cutoff score of 1 or greater, the prevalence of drinking problems in our sample was

Table 2. Demographic Predictors of Drinking Problems

	CAGE Score ≥ 2 (95% CI)				CAGE Score ≥ 1 (95% CI)			
	Odds Ratio	Lower Limit	Upper Limit	P Value	Odds Ratio	Lower Limit	Upper Limit	P Value
Age group								
60 – 74*								
75 – 84	0.61	0.26	1.45	0.26	0.66	0.40	1.10	0.11
85+	0.31	0.08	1.27	0.10	0.32	0.13	0.74	0.01
Sex								
Female*								
Male	26.87	4.49	160.77	<0.001	26.07	8.24	82.42	<0.0001
Ethnicity								
Chinese*								
Malay	0.78	0.43	1.40	0.40	0.47	0.31	0.73	0.001
Indian	1.79	1.06	3.00	0.03	1.33	0.92	1.91	0.13
Others	1.43	0.34	6.07	0.63	0.99	0.31	3.16	0.99
Marital status								
Married/cohabiting*								
Never married	1.56	0.54	4.48	0.41	1.80	0.88	3.69	0.11
Widowed	1.02	0.29	3.58	0.98	1.00	0.49	2.05	1.00
Divorced/separated	2.92	1.11	7.63	0.03	1.79	0.73	4.41	0.21
Education								
None*								
Some, but did not complete primary	0.72	0.21	2.49	0.61	1.04	0.46	2.36	0.93
Completed primary	0.76	0.20	2.85	0.68	0.79	0.32	1.92	0.60
Completed secondary	0.66	0.16	2.71	0.57	0.67	0.26	1.72	0.40
Completed tertiary	0.44	0.10	1.95	0.28	0.39	0.14	1.08	0.07
Employment status								
Paid work (part-time and full-time)*								
Unemployed	0.74	0.12	4.69	0.74	1.98	0.60	6.60	0.26
Homemaker	4.27	0.43	42.66	0.22	2.78	0.64	12.09	0.17
Retired	1.25	0.64	2.42	0.52	1.14	0.71	1.83	0.58

CI: Confidence interval

*Referent group.

found to be 10.1% (unweighted prevalence: 8.5%). Similar to using a CAGE cutoff score of 2 or greater, the use of a lower cutoff score found men (OR: 26.1, 95% CI, 8.2, 82.4) to be significantly more likely than women to have drinking problems. Malay ethnicity and those aged 85 years and above emerged as significant correlates of drinking problems, with Malays being less likely than Chinese (OR: 0.5; 95% CI, 0.3, 0.7) and those aged 85 years and above (OR: 0.3; 95% CI, 0.1, 0.7) being less likely than those aged 60 to 74 years to report drinking problems.

Discussion

The use of CAGE cutoff score of 2 or greater yielded

a prevalence estimate of 4.2% in our sample for lifetime drinking problems. This estimate, though higher than the rate of AUDs (1.6%) among individuals over 65 years old in Singapore,⁴⁷ was comparable to past studies such as León-Muñoz et al,³⁷ and Hoeck and Van Hal³⁵ which found 3.1% of their Spanish sample aged 60 years and above to have alcohol use problems, and 4.7% of elderly Belgian adults aged 65 years and above to have drinking problems, respectively.

However, in view of increasing evidence indicating a rising trend in the prevalence of alcohol problems among older adults aged 65 years and over^{2,3} and the relatively low estimate of drinking problems in the current sample,

Table 3. Drinking Problems as a Predictor of Other Conditions*

Outcome Variable	95% CI			P Value
	Odds Ratio	Lower Limit	Upper Limit	
Depression	2.66	1.31	5.39	0.01
Anxiety	1.79	0.83	3.82	0.14
Obesity	1.73	0.66	4.54	0.26
Smoking	1.95	0.97	3.91	0.06
Hypertension	1.79	0.78	4.12	0.17
Heart trouble [†]	0.99	0.47	2.11	0.98
Stroke	2.04	0.78	5.38	0.15
TIA ^s	1.98	0.43	9.23	0.38
Diabetes	1.17	0.60	2.28	0.64

CI: Confidence interval; TIA: Transient ischaemic attack

*Findings were adjusted for age, sex, ethnicity, marital status, level of education and employment status.

[†]Heart trouble includes heart attack, angina, heart failure, valve disease and other related conditions.

supplementary analysis was conducted using a lower CAGE cutoff score of 1 or greater given some evidence for increased sensitivity and specificity among the elderly population using a lower cutoff score.⁴⁶ In using a CAGE cutoff score of 1 or greater, 10.1% of the sample was found to report lifetime drinking problems. While this figure was still slightly lower than the frequency of lifetime heavy drinking (15.9%) among adult Singapore residents aged between 18 and 65 years,⁴⁷ it fell within the range of drinking problems prevalence estimates in Western samples,^{2,3} suggesting some similarity across cultures with respect to the frequency of drinking problems among older adults.

The lack of significant variation between our sample and Western samples could be due to accelerated Westernisation as well as economic factors that have increased the availability of alcoholic beverages in Singapore, similar to the changes that occurred in China within the past few decades, which ultimately served to increase alcohol consumption in China.⁴⁸ Regardless of the reason, the relatively common occurrence of drinking problems in our sample, increased susceptibility to the negative effects of excessive alcohol use among elderly, and the low rate of treatment-seeking among those with drinking problems in Singapore²⁰ indicate the need for greater awareness of excessive alcohol consumption among policymakers who can work towards improving public health outcomes for the elderly in Singapore.

Evidence from studies conducted across cultures, including Singapore, corroborate our finding of increased risk of alcohol-related problems in men relative to women.^{11,18,20,28,49} One factor contributing to the increased risk of drinking problems in males could be the greater acceptability of alcohol consumption among men compared

to women among Chinese⁴⁸ who comprise the majority of Singapore residents. The combination of a general increased risk of alcohol consumption and a more permissive social context for drinking in Singapore among men might explain why they were 27 more times as likely to report drinking problems as women.

The other risk factors identified in the present study (i.e. Indian ethnicity, being divorced/separated) were somewhat consistent with those reported in previous studies on alcohol use among adults aged 18 to 65 years in Singapore.^{19,20,28} Abdin et al²⁸ found that, relative to Chinese, Indians were more likely to report regular alcohol use and transition from regular alcohol use to alcohol abuse and alcohol dependence. Subramaniam et al²⁰ found that Indians were more likely than Chinese to have lifetime alcohol dependence and that divorced/separated individuals were more likely than single individuals to have any AUD within the past 12 months. In addition, Lim et al¹⁹ found that being divorced/separated increased the risk of lifetime heavy drinking relative to being single, though the study did not find a significant association between Indian ethnicity and heavy drinking.

It is unclear why divorce/separation may be specifically linked to drinking problems in Singapore. However, given that stressful events have been postulated as a moderator of alcohol use over time,⁵⁰ it is possible that the stress associated with separation from one's spouse interacts with other factors to predict greater alcohol consumption. Furthermore, the finding that Indians are more likely to develop AUDs from regular use might explain why Indian ethnicity increases the risk of drinking problems and alcohol dependence, but not heavy drinking. Such a phenomenon could, in turn, be explained by differences in cultural and/or religious attitudes governing alcohol consumption as well as in biological processes responsible for metabolising alcohol. However, given mixed evidence on the relationship between Indian ethnicity and drinking problems, further research is needed to better interpret current findings. Nonetheless, the demographic variables that have been consistently identified as risk factors for drinking problems in Singapore—male sex and being divorced/separated—provide guidance for the development of public health policies aimed to curb such problems across age groups.

Drinking problems also predicted depressive symptoms within the past 1 month, corroborating findings from previous studies.²² In particular, using the same measure of alcohol use problems (i.e. CAGE), Bell et al³⁴ found that drinking problems doubled the likelihood of having depressive symptoms within the past week. Likewise, a longitudinal study by Gilman and Abraham⁵¹ reported that alcohol dependence and major depression (including subthreshold depressive symptoms) were strong risk factors for the development of the other disorder at 1-year

follow-up. Our findings contribute to the body of evidence that indicate a relationship between drinking problems and depressive symptoms. Taken together, they suggest that screening for depressive symptoms among elderly with drinking problems and vice versa may be useful in identifying comorbidities, which can facilitate treatment planning. Furthermore, given that studies have shown that both case-level and subthreshold depression are associated with substantial impairment in functioning,^{41,52,53} screening and treatment of depression among elderly with drinking problems could result in a better prognosis.

Evidence on the association between alcohol use and disability is mixed.²⁵ Congruent with present findings, drinking problems were not found to be associated with disability in some Western samples of older adults.³⁶ In addition, Lim et al¹⁹ reported no significant difference in the quality of life between heavy drinkers without AUD and non-heavy drinkers in Singapore. One reason for the lack of significant association in our sample could be that we did not account for the role of potential moderators of the relationship between drinking problems and disability. For example, Cheng and McBride⁵⁴ found that the relationship between alcohol dependence and physical disability depended on the presence of antecedent mental disorders, whereas Karlamangla et al⁵⁵ found that the effect of alcohol consumption on disability was contingent on the pre-existing health status among older adults. Clearly, investigating the complex relationship between drinking problems and disability requires consideration of the moderating effects of other factors, so as not to obscure any potential significant links between the 2 variables.

Limitations

The CAGE questionnaire has been widely used as a screening instrument for alcohol use problems,⁵⁶ rather than as a comprehensive measure of alcohol consumption. Thus, analyses were based on a rudimentary classification of alcohol consumption patterns, which means that conclusions that can be drawn from the current data are limited in scope. Furthermore, the CAGE evaluates the presence of lifetime drinking problems, rather than current drinking problems. Hence, individuals who had quit drinking years before their participation in the study (ex-problem drinkers) would have been classified as those with drinking problems in our sample, even if they were no longer experiencing active symptoms of drinking problems. This presents a problem in examining the relationship between drinking problems and other variables as 1) individuals who do not have current symptoms of drinking problems are different from those with current symptoms of drinking problems, and 2) lifetime drinking problems provides a protracted timeline during which multiple events could occur without

overlapping. For example, individuals who quit drinking many years ago and are only currently experiencing minimal residual symptoms of drinking problems (if any) might have developed depressive symptoms within the past 1 month, fulfilling both our criteria for drinking problems and depressive symptoms. Yet, it would be unlikely that the 2 events are linked. In addition, examining the relationship between lifetime drinking problems and 1-month disability might partially explain the lack of a significant relationship between drinking problems and disability. Using concordant timelines (e.g. 12-month prevalence and 1-month impairment) would better illustrate the impact of alcohol consumption on disability.

Moreover, because the CAGE assessed self-reported drinking problems, heavy drinkers who did not feel that they had any problem with their drinking habits would have been classified as those without drinking problems. As a result, “those without drinking problems” could have had more severe current alcohol use problems than “those with drinking problems” in our sample.

The interview-based format of survey administration also presents the possibility of underreporting of drinking problems, particularly if alcohol use has negative social or cultural connotations for the individual. For instance, Muslim participants might have underreported their alcohol consumption, which is expressly forbidden in the Quran, the primary religious text of Islam. Thus, future studies aiming to elucidate drinking problems among the elderly may benefit from using more comprehensive measures that incorporate information from other sources (e.g. family members, clinicians).

The cross-sectional nature of the study does not allow for the establishment of temporal relationships. As such, we are unable to determine the direction of the association between drinking problems and depressive symptoms, as well as the ways in which these symptoms might interact over time. Prospective research on this relationship to identify the developmental progression of alcohol use and depression may have significant implications for prevention and intervention efforts. The design of the study introduces the possibility of survivor bias as those with more impaired drinking problems may have died before the age of 60, leaving a relatively well functioning group of those with drinking problems in our sample. Finally, although the current study briefly explored the prevalence and demographic correlates of drinking problems using a lower cutoff score, an in-depth analysis was not carried out. Future studies can examine the use of a lower CAGE cutoff score, given that past studies have shown some evidence of increased sensitivity and specificity when using a lower cutoff.

Conclusion

In the present study, we examined alcohol consumption among the elderly in Singapore and found that male sex, Indian ethnicity and being divorced or separated were significantly associated with drinking problems. Individuals with drinking problems were also more likely to have subthreshold depression within the past month. However, lifetime drinking problems were not significantly linked to disability. Our findings are consistent with previous studies on alcohol use in Singapore adults and add to the body of research that indicate a link between drinking problems and depressive symptoms among the elderly. This study suggests a need for public health campaigns and policies to raise the awareness and address alcohol use problems among the elderly, as well as to support the screening and treatment of depressive symptoms in the elderly with drinking problems.

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