Table 3. Associations between each factor and feeling happy/unhappy at junior high school.

				Feeling happy/unhappy at school		
				Happy at school	Neither/nor	Unhappy at school
			N	%	%	%
Total			37,991	67.2	26.1	6.6
Boys	*Intending to study at university	Yes	2,888	70.3	23.0	6.7
		No	12,232	69.4	24.9	5.7
		Not yet decided	3,565	56.7	32.9	10.4
	*Participating in extracurricular activities	Yes	15,498	69.6	24.7	5.7
		No	3,102	55.2	32.9	11.9
	*Having breakfast	Everyday	16,677	69.5	24.8	5.6
		Sometimes	1,334	50.7	36.7	12.6
		Seldom	762	42.8	36.1	21.1
	*Bedtimes	Before or at midnight	13,758	70.3	24.5	5.2
		After midnight	4,901	58.5	30.4	11.1
	*Smoking (past 30 days)	No	18,298	67.6	26.1	6.3
		Yes	457	47.7	26.3	26.0
	*Drinking (past 30 days)	No	16,963	68.0	25.9	6.1
		Yes	1,630	59.8	27.6	13.6
	*Mental health status	Good	12,948	75.2	22.1	2.7
		Poor	5,759	49.0	35.1	15.9
Girls	*Intending to study at university	Yes	2,545	72.6	22.4	5.0
		No	13,778	68.3	25.7	6.0
		Not yet decided	2,811	58.0	31.7	10.2
	*Participating in extracurricular activities	Yes	14,995	65.7	27.2	7.1
		No	3,975	58.6	30.5	10.9
	*Having breakfast	Everyday	17,214	69.4	25.0	5.6
		Sometimes	1,377	50.5	37.5	12.0
		Seldom	616	49.0	31.5	19.5
	*Bedtimes	Before or at midnight	12,526	70.5	24.7	4.8
		After midnight	6,600	61.4	28.9	9.7
	*Smoking (past 30 days)	No	18,917	67.8	26.0	6.2
		Yes	273	39.9	36.3	23.8
	*Drinking (past 30 days)	No	17,251	68.6	25.5	5.9
		Yes	1,776	56.8	30.9	12.4
	*Mental health status	Good	10,452	79.6	18.8	1.6
		Poor	8,705	52.8	34.9	12.3

Subjects for whom data were missing were excluded from the analysis.
*P value was calculated by $\chi 2$-test, each factors(Intending to study at university, Participating in extracurricular activities, Having breakfast, Bedtimes, breakfast, Bedtimes, Smoking, Drinking, Mental health status), $P<0.01$.
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Table 4. Associations between each factor and feeling happy/unhappy at senior high school.

				Feeling happy/unhappy at school		
				Happy at school	Neither/nor	Unhappy at school
			N	%	%	%
Total			59,341	62.3	29.0	8.7
Boys	***Intending to study at university**	Yes	17,173	63.5	28.7	7.8
		No	9,125	58.9	31.1	10.0
		Not yet decided	2,656	43.2	38.9	17.9
	***Participating in extracurricular activities**	Yes	19,157	65.7	27.2	7.1
		No	9,775	49.3	36.7	14.0
	***Having breakfast**	Everyday	23,362	63.1	29.0	7.9
		Sometimes	3,102	50.6	37.2	12.2
		Seldom	2,545	45.1	35.3	19.6
	***Bedtimes**	Before or at midnight	13,073	64.2	28.4	7.4
		After midnight	15,861	56.9	32.0	11.1
	***Smoking (past 30 days)**	No	26,940	61.2	30.1	8.6
		Yes	2,039	46.4	34.0	19.6
	***Drinking (past 30 days)**	No	23,711	61.2	30.4	8.4
		Yes	5,153	55.3	30.5	14.2
	***Mental health status**	Good	16,412	69.7	25.9	4.3
		Poor	12,523	47.4	36.3	16.0
Girls	***Intending to study at university**	Yes	16,607	69.8	24.5	5.8
		No	11,167	60.6	30.2	9.2
		Not yet decided	2,499	45.3	36.7	18.0
	***Participating in extracurricular activities**	Yes	18,614	69.9	24.6	5.5
		No	11,580	55.4	32.5	12.2
	***Having breakfast**	Everyday	25,821	66.8	26.5	6.8
		Sometimes	2,920	52.2	34.7	13.2
		Seldom	1,580	47.8	32.7	19.6
	***Bedtimes**	Before or at midnight	12,305	67.3	26.3	6.4
		After midnight	17,950	62.3	28.5	9.2
	***Smoking (past 30 days)**	No	29,248	65.3	27.3	7.4
		Yes	1,042	38.3	35.6	26.1
	***Drinking (past 30 days)**	No	24,895	66.1	26.8	7.0
		Yes	5,282	56.1	31.1	12.8
	***Mental health status**	Good	12,465	77.9	19.7	2.3
		Poor	17,803	54.9	33.1	12.0

Subjects for whom data were missing were excluded from the analysis.
*P value was calculated by $\chi 2$-test, each factors(Intending to study at university, Participating in extracurricular activities, Having breakfast, Bedtimes, breakfast, Bedtimes, Smoking, Drinking, Mental health status), $P<0.01$.
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Table 5. Multiple logistic regression analysis of the association between feeling unhappy at school and each of the factors.

	Junior high school		Senior high school	
	Unhappy at school		Unhappy at school	
	AOR	95%CI	AOR	95%CI
Sex*				
Boys	1.00		1.00	
Girls	0.71	0.65–0.78	0.68	0.64–0.72
Grade*				
7 and 10	1.00		1.00	
8 and 11	1.21	1.09–1.35	0.95	0.88–1.02
9 and 12	0.83	0.74–0.94	0.88	0.81–0.95
Intending to study at university*				
Yes	1.00		1.00	
No	0.98	0.86–1.11	1.36	1.27–1.45
Not yet decided	1.79	1.54–2.08	2.34	2.14–2.56
Participating in extracurricular activities*				
Yes	1.00		1.00	
No	1.77	1.59–1.97	1.87	1.75–1.99
Having breakfast*				
Everyday	1.00		1.00	
Sometimes	1.59	1.39–1.82	1.27	1.16–1.39
Seldom	2.27	1.93–2.67	1.94	1.77–2.13
Bedtimes*				
Before or at midnight	1.00		1.00	
After midnight	1.45	1.32–1.59	1.21	1.13–1.29
Smoking (past 30 days)*				
No	1.00		1.00	
Yes	2.35	1.90–2.90	1.6	1.43–1.79
Drinking (past 30 days)*				
No	1.00		1.00	
Yes	1.39	1.22–1.58	1.26	1.14–1.32
Mental health status*				
Good	1.00		1.00	
Poor	6.75	6.08–7.50	4.51	4.19–4.86

Abbreviations: AOR = adjusted odds ratio, CI = confidence interval.
Feeling unhappy at school: Students who selected "No, I don't" in response to the question asking whether the respondent felt happy at school (answer options: "Yes, I do", "Yes and no", and "No, I don't").
Subjects for whom data were missing were excluded from the analysis.
Sex, Grade, Intending to study at university, Participating in extracurricular activities, Having breakfast, Bedtimes, Smoking, Drinking, and Mental health status were used as covariance values.
For calculation of the P values, a multivariate analysis model was used, *P<0.01.
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Multiple logistic regression analysis of the association between feeling unhappy at school and various factors

The adjusted odds ratio (AOR) and its 95% confidence interval (CI) for the association between feeling unhappy at school and each of the factors related to lifestyle habits and mental status are shown in Table 5. Among junior high school students, the AORs for those who seldom ate breakfast, who had smoked in the past 30 days, or who exhibited poor mental health were higher than 2.00. In particular, the AOR was highest for students who claimed that their mental health was poor (AOR: 6.75, CI: 6.08–7.50).

Among the high school students, the AORs for those who had not yet decided their future course or those who exhibited poor mental health were higher than 2.00. In particular, the AOR for students who claimed that their mental health was poor was the highest (AOR: 4.51, CI: 4.19–4.86).

Discussion

We believe that the present sample is representative of Japanese adolescents because (1) the participating schools were selected randomly from among junior and senior high schools nationwide and (2) approximately 100,000 responses were analysed. To our knowledge, the present study is the first large-scale epidemiological study to have investigated the prevalence of unhappiness at school

among junior and senior high school students and the factors associated with such feelings.

In this study, the proportions of junior and senior high school students who claimed to feel unhappy at school were 6.5% and 8.6%, respectively (Table 2). According to a government survey conducted on approximately 1,000 Japanese junior high school students, the proportion of those who claimed to feel unhappy at school was 5.6% [14], which was similar to the present result. The same survey also indicated that the proportion of male junior high school students who were unhappy at school was higher than that of female junior high school students, corresponding with our study's result. Although no other studies offer data on sex-based comparisons with regard to unhappiness at school, it may be determined that girls are more adaptive to school than are boys. As the total number of students attending junior and senior high schools in Japan is almost seven million [29], these reported answers and statistical analysis suggest that as many as several hundred thousand students may feel unhappy at school.

In the present study, the proportions of students who claimed to feel unhappy at school were significantly higher among those who had not yet decided their future course, who did not eat breakfast every day, who had used tobacco or alcohol in the past 30 days, who did not participate in extracurricular activities, had late bedtimes, or who had poor mental health compared to the others ($p<0.01$; Tables 3 and 4). When dealing with students who fall into the above-mentioned categories, educators and administrators alike should consider that such students might not be able to adjust well to school. In addition, when teachers and parents develop measures to improve students' adaptivity to school, they must plan comprehensive measures, while also considering students belonging to the above-mentioned categories. With regard to the percentage of students who felt unhappy at school, the same factor trends were observed among both junior and senior high school students (Tables 3 and 4). The only factor that indicated a different trend between junior and senior high school students was an intention to study at university. The circumstances surrounding maladaptation may be the same for both junior and senior high school students.

The sex-based AORs for unhappiness at school were significantly lower ($p<0.01$) in both junior and senior high school girls (Table 5). When providing counselling and guidance, teachers should bear in mind that male students tend to develop feelings of unhappiness at school more easily than do female students. With regard to the AORs for feeling unhappy at school based on grade, the AORs for 9th and 12th graders were the lowest. This result was not affected by differences in future course after leaving the current school, because it was adjusted for intention to attend university. To clarify which factors were responsible for the lowest AORs among 9th and 12th grade students, further research on characteristics peculiar to students in these grades is required.

Intention to attend university and participation in extracurricular activities were considered to be factors pertaining to school engagement. For junior high school students who had not yet decided their future course and for senior high school students who had either not yet decided on their future course or had decided not to attend university, the AORs for feeling unhappy at school were significantly higher than for junior and senior high school students who did intend to go to university ($p<0.01$; Table 5). This result may suggest the importance of helping students decide their future courses early, and of supporting high school students who do not intend to go to university. The AORs for unhappiness at school among junior and senior high school students who did not participate in extracurricular activities were significantly higher ($p<0.01$) than for those who did. In school life, in addition to class attendance, participation in extracurricular activities is vitally important (Table 5).

Eating breakfast and bedtime were also factors that impacted on the lifestyle habits of students. The AORs for feeling unhappy at school among students who did not eat breakfast every day or who did not go to bed before midnight were significantly higher ($p<0.01$) than for those who did (Table 5). To deal with students' feelings of school maladaptation, intervention by students' family members, as well as teachers and administrators is important.

The AOR for feeling unhappy at school among students who used tobacco or alcohol was significantly higher ($p<0.01$) than for those who did not (Table 5). Henry et al. [30]reported that students who expressed poor school bonding (not feeling happy at school, and so on) were much more likely to use alcohol, and this fits with the results of the present study. Henry et al. [8] also reported that truancy was a significant predictor of initiating alcohol and tobacco use. Generally, as feeling unhappy at school is a cause of truancy, the stress caused by school maladaptation may lead students to start using tobacco or alcohol. The need to improve the adaptivity of adolescents to school was suggested in order to prevent them from using tobacco or alcohol.

The AOR for feeling unhappy at school among students in poor mental health was significantly higher ($p<0.01$) than the AOR for those in good mental health (Table 5). This AOR was considerably higher than the AORs found for the other factors. It was confirmed that, in comparison with other factors related to lifestyle habits and school life, mental health was most strongly associated with unhappiness at school. Egger et al. [9] reported that truant adolescents were more likely to exhibit depression. One of the mental health questions in the present questionnaire was similar to the GHQ-12 question on depressive symptoms. As feeling unhappy at school may be associated with depression. As feeling unhappy at school may be associated with depression, teachers and parents may need to view such feelings as an important adolescent mental health issue and take appropriate measures to prevent it.

The following two suggestions can be provided based on the results of the multiple logistic regression analyses regarding adolescents' unhappiness at school. First, when providing healthcare guidance to students, school employees and administrators must consider that adolescents' irregular lifestyle habits, low school engagement, tobacco or alcohol use, and poor mental health are all associated with school maladaptation and possible future truancy. Second, family members of adolescents must be aware that irregular lifestyle habits, tobacco or alcohol use, and poor mental health are associated with school maladaptation. If it is suspected that a child feels unhappy at school because of insufficient nutritional intake or lack of sleep, his/her family is required to take corrective measures, such as helping their children lead regular lives.

The present study had some limitations. First, as it was cross-sectional in design, causal relationships could not be determined. For instance, a student may not have participated in extracurricular activities because he/she felt unhappy at school. On the other hand, a student may have felt unhappy at school because he/she did not participate in extracurricular activities. Longitudinal studies will be needed to elucidate the causality of this issue. Second, data from students who were absent from school on the survey day and school dropouts were excluded from the analyses. The percentage of students who felt unhappy at school may have been higher among absentees and dropouts than it was among those who were in attendance on the day of the study. The Japanese Education Ministry has reported that

the proportions of junior and senior high school students who are absent from school 30 days or more per year for reasons other than illness or economic difficulties are 2.6% and 1.7%, respectively [31]. The dropout rate among high school students in this survey was 1.6% [31] (that among junior high school students is not available because junior high school education is compulsory in Japan). Thus, the proportions of students who felt unhappy at school may have been underestimated. Moreover, the data regarding the nine factors investigated in the present study may have been biased. Third, we only investigated the associations between feeling unhappy at school and each of nine factors. This study did not examine all of the elements that may have possibly affected feelings toward school and their relationships with each of the nine factors of interest. For instance, somatic complaints, including abdominal pain and headache, or externalized behaviour problems such as defiance and noncompliance were not assessed. Many more factors that could affect happiness at school must be included in future studies. Fourth, happiness is a subjective emotion. Different students may feel very differently about the same circumstances, depending on their own characteristics and customs. Therefore, the possibility of introducing an objective scale that can be used effectively in a large-scale epidemiological survey must be considered. Lastly, limited space on the questionnaire allowed us to pose only two questions from among 12 on the GHQ as a mental health measure. If more weight must be given to adolescents' mental health status in future surveys, all 12 GHQ questions may need to be included for more accurate measurement.

Conclusions

This large-scale epidemiological study of junior and senior high school students in Japan has revealed that feeling unhappy at school is associated with being male, having an undecided future course, not participating in extracurricular activities, not eating breakfast every day, going to bed late, using tobacco or alcohol, and being in poor mental health. Policy makers must promote further investigations into how feeling unhappy at school is associated with the initiation of tobacco or alcohol use or the onset of mental disorders such as depression.

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Author Contributions

Conceived and designed the experiments: YK YO HK TO. Performed the experiments: OI YK MI RY SN TO. Analyzed the data: HM OI YK HI YO. Wrote the paper: HM OI YK HI.

References

1. Henry KL (2007) Who's skipping school: characteristics of truants in 8th and 10th grade. J Sch Health 77: 29–35.
2. Vaughn MG, Maynard BR, Salas-Wright CP, Perron BE, Abdon A (2013) Prevalence and correlates of truancy in the US: results from a national sample. J Adolesc 36: 767–776.
3. Petrides KV, Chamorro-Premuzic T, Frederickson N, Furnham A (2005) Explaining individual differences in scholastic behaviour and achievement. Br J Educ Psychol 75: 239–255.
4. Best D, Manning V, Gossop M, Gross S, Strang J (2006) Excessive drinking and other problem behaviours among 14–16 year old schoolchildren. Addict Behav 31: 1424–1435.
5. Henry KL, Thornberry TP (2010) Truancy and escalation of substance use during adolescence. J Stud Alcohol Drugs 71: 115–124.
6. White HR, Violette NM, Metzger L, Stouthamer-Loeber M (2007) Adolescent risk factors for late-onset smoking among African American young men. Nicotine Tob Res 9: 153–161.
7. Chou LC, Ho CY, Chen CY, Chen WJ (2006) Truancy and illicit drug use among adolescents surveyed via street outreach. Addict Behav 31: 149–154.
8. Henry KL, Huizinga DH (2007) Truancy's effect on the onset of drug use among urban adolescents placed at risk. J Adolesc Health 40: 358.e359–317.
9. Egger HL, Costello EJ, Angold A (2003) School refusal and psychiatric disorders: a community study. J Am Acad Child Adolesc Psychiatry 42: 797–807.
10. Hirschfield PJ, Gasper J (2011) The relationship between school engagement and delinquency in late childhood and early adolescence. J Youth Adolesc 40: 3–22.
11. Attwood G, Croll P (2006) Truancy in secondary school pupils: prevalence, trajectories and pupil perspectives. Research Papers in Education 21: 467–484.
12. Vaughn MG, Wexler J, Beaver KM, Perron BE, Roberts G, et al. (2011) Psychiatric correlates of behavioral indicators of school disengagement in the United States. Psychiatr Q 82: 191–206.
13. Kuramoto H (1995) Comparison of behavioral and emotional problems related to school nonattendance in Japanese elementary and junior high school students (in Japanese). Nihon Koshu Eisei Zasshi 42: 930–941.
14. Cabinet Office, Government of Japan (2007) The survey of life-styles and attitudes in Japan's early adolescents, 2007 (in Japanese). Available: http://www8.cao.go.jp/youth/kenkyu/teinenrei2/pdf/gaiyou.pdf. Accessed 14 Apr. 2014.
15. Maynard BR, Salas-Wright CP, Vaughn MG, Peters KE (2012) Who are truant youth? Examining distinctive profiles of truant youth using latent profile analysis. J Youth Adolesc 41: 1671–1684.
16. U.S. Department of Education, National Center for Education Statistics (2006) The Condition of Education 2006. NCES 2006-071.
17. Kearney CA (2008) School absenteeism and school refusal behavior in youth: a contemporary review. Clin Psychol Rev 28: 451–471.
18. Penfold SC, van Teijlingen ER, Tucker JS (2009) Factors associated with self-reported first sexual intercourse in Scottish adolescents. BMC Res Notes 2: 42.
19. Suzuki K, Minowa M, Osaki Y (2000) Japanese national survey of adolescent drinking behavior in 1996. Alcohol Clin Exp Res 24: 377–381.
20. Ohida T, Osaki Y, Doi Y, Tanihata T, Minowa M, et al. (2004) An epidemiologic study of self-reported sleep problems among Japanese adolescents. Sleep 27: 978–985.
21. Kaneita Y, Ohida T, Osaki Y, Tanihata T, Minowa M, et al. (2006) Insomnia among Japanese adolescents: A nationwide representative survey. Sleep 29: 1543–1550.
22. Munezawa T, Kaneita Y, Osaki Y, Kanda H, Minowa M, et al. (2011) The association between use of mobile phones after lights out and sleep disturbances among Japanese adolescents: a nationwide cross-sectional survey. Sleep 34: 1013–1020.
23. D'Arcy C, Siddique CM (1984) Psychological distress among Canadian adolescents. Psychol Med 14: 615–628.
24. Doi Y, Minowa M (2003) Factor structure of the 12-item General Health Questionnaire in the Japanese general adult population. Psychiatry Clin Neurosci 57: 379–383.
25. Kaneita Y, Yokoyama E, Harano S, Tamaki T, Suzuki H, et al. (2009) Associations between sleep disturbance and mental health status: a longitudinal study of Japanese junior high school students. Sleep Med 10: 780–786.
26. Shimbo M, Nakamura K, Jing Shi H, Kizuki M, Seino K, et al. (2005) Green tea consumption in everyday life and mental health. Public Health Nutr 8: 1300–1306.
27. Ohida T, Kamal AM, Uchiyama M, Kim K, Takemura S, et al. (2001) The influence of lifestyle and health status factors on sleep loss among the Japanese general population. Sleep 24: 333–338.
28. Suzuki H, Kaneita Y, Osaki Y, Minowa M, Kanda H, et al. (2011) Clarification of the factor structure of the 12-item General Health Questionnaire among Japanese adolescents and associated sleep status. Psychiatry Res 188: 138–146.
29. Ministry of Education, Culture, Sports, Science and Technology (MEXT) (2012) School basic survey (in Japanese). Available: http://www.mext.go.jp/b_menu/toukei/chousa01/kihon/1267995.htm. Accessed 14 Apr. 2014.
30. Henry KL, Slater MD (2007) The contextual effect of school attachment on young adolescents' alcohol use. J Sch Health 77: 67–74.
31. Ministry of Education, Culture, Sports, Science and Technology (MEXT) (2011) Research on issues over teacher guidance toward student's problematic behavior in Japan (in Japanese). Available: http://www.mext.go.jp/b_menu/houdou/25/03/__icsFiles/afieldfile/2013/03/15/1331725_02_1.pdf. Accessed 2014 April 14.

RESEARCH ARTICLE

Reliability and Validity of the Alcohol Use Disorders Identification Test - Consumption in Screening for Adults with Alcohol Use Disorders and Risky Drinking In Japan

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Abstract

Background: Alcohol is well established as a risk factor for cancer development in many organ sites. To assess the reliability and validity of the Alcohol Use Disorders Identification Test - Consumption (AUDIT-C) for detecting alcohol use disorders or risky drinking in Japanese adults the present study was conducted. Materials and Methods: A test-retest method was applied with a 2-week interval with 113 health care employees. The κ coefficient, Cronbach's coefficient alpha, Spearman's correlation coefficient, and intraclass correlation coefficient (ICC) were determined and the validity of the AUDIT-C was analyzed using the data from a nationwide survey on adult alcohol use conducted in 2008 (n=4,123). Results: The reliability of the AUDIT-C score was high (κ coefficient=0.63, Cronbach's alpha=0.98, correlation coefficient=0.95, and ICC=0.95). According to the likelihood ratio and Youden index, appropriate cutoffs for the AUDIT-C were ≥5points in men and ≥4 points in women. The sensitivity and specificity of these cutoffs for identifying ≥8 points on the AUDIT were 0.88 and 0.80, respectively, for men (positive likelihood ratio [LR+]=4.5) and 0.96 and 0.87, respectively, for women (LR+=7.7). The sensitivity and specificity of the cutoffs for identifying ≥12 points on the AUDIT were 0.90 and 0.84, respectively, for men (LR+=5.8) and 0.93 and 0.94, respectively, for women (LR+=15.8). The sensitivity and specificity of the cutoffs for identifying ≥16 points on the AUDIT were 0.93 and 0.80, respectively, for men (LR+=4.7) and 0.92 and 0.98, respectively, for women (LR+=55.6). With higher scores on the AUDIT, the specificity decreased and false-positives increased. The appropriate cutoffs for identifying risky drinking were the same for both genders. Conclusions: The reliability and validity of the AUDIT-C are high, indicating that it is useful for identifying alcohol use disorders or risky drinking among the general population in Japan, a group at high risk of cancer development.

Keywords: AUDIT-C - alcohol use disorders - alcohol use disorders identification test - screening - risk drinking

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Introduction

Excessive alcohol consumption is associated with not only multiple health problems including cancer but also many social problems such as drunken driving, child abuse, and domestic violence; it also leads to substantial social expense (WHO, 2009; Osaki et al., 2012; de Menezes et al., 2013; Yaegashi et al., 2014). Screening tests have been proposed to identify alcohol use disorders. The Alcohol Use Disorders Identification Test (AUDIT) is one of the popular screening tests used in Western countries, and an intervention program based on the results of this test has been introduced (Babor et al., 2001).

The test consists of 10 questions, and each response for the questions is assigned a specific score. The total AUDIT score is calculated by adding up the scores from all of the questions. Based on the AUDIT score, respondents are classified into categories of alcohol use disorders (Babor et al., 2001).

The AUDIT was developed as a self-reported tool; however, in general health care settings, a substantial amount of time may be required to respond to all of the questions. Owing to the attention placed on social problems relating to alcohol use disorders globally, the Japanese government has recently started to address alcohol problems. In Japan, a brief intervention to reduce alcohol consumption in people with an alcohol use disorder at clinics or during health examinations has been expected in recent years. Therefore, a short screening test is required by busy medical facilities in Japan.

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The AUDIT Consumption (AUDIT-C) includes the first 3 questions of the AUDIT and is proposed and used in Western countries. The reliability and validity of the AUDIT-C have been determined for use in Western countries. To detect problem drinking, the proposed cutoffs for the AUDIT-C are ≥5points for men and ≥3 points for women (Johnson et al, 2013). The present study aimed to assess the reliability and validity of the AUDIT-C for detecting suspected alcohol dependence, alcohol use disorders, or risky drinking in Japanese adults. To the best of our knowledge, this study is the first conducted in an Asian country to assess the reliability and validity of the AUDIT-C.

Materials and Methods

Assessment of the reliability of the AUDIT-C

The reliability of the AUDIT-C was assessed using a test-retest method to determine its reproducibility. The subjects were 113 employees working in psychiatry medical clinics (n=27), a nursing facility (n=51), a rehabilitation facility (n=21), and a health examination organization (n=14) in Mie Prefecture, Japan. We asked the subjects to complete the AUDIT-C twice with 2 weeks between the 2 tests. The survey was conducted in October 2011.

Assessment of the validity of the AUDIT-C

We assessed the validity of the AUDIT-C using data from a nationwide survey on adult drinking behaviors in Japan conducted in 2008. The nationwide survey was interview-based and conducted in the subjects' homes; subjects were selected randomly from resident register lists of the municipalities. Of the selected 6,956 subjects, 4,123 people responded to the survey (response rate=59.3%). Trained interviewers visited the subjects' houses and asked them to participate in the survey.

The questionnaire included the full AUDIT in addition to questions about alcohol use behaviors including the frequency of alcohol use, average alcohol consumption on a day that included drinking, and the frequency of binge drinking (pure alcohol consumption ≥60 g per drinking occasion).

Ethical approval was provided by the ethical committees of the Faculty of Medicine of Tottori University and the Kurihama Medical and Alcohol Center.

Statistical analyses

To determine the reliability, we calculated the κ coefficient, Cronbach's coefficient alpha, Spearman's correlation coefficient, and intraclass correlation coefficient (ICC).

The validity was assessed by comparing the total score of the full AUDIT, which was considered the gold standard, with the AUDIT-C score. We calculated the sensitivity and specificity. We also determined appropriate cutoffs for the AUDIT-C in the Japanese population using the positive likelihood ratio and Youden index (Youden, 1950; Akobeng, 2007). Youden index is defined as "sensitivity+specificity - 1".

We also assessed the effectiveness of the AUDIT-C for identifying risky drinking. Risky drinking was defined as heavy drinking (280 g pure alcohol/week for men and 168 g pure alcohol/week for women) or binge drinking (consumption of 60 g pure alcohol on ≥1 occasion per week). Statistical analyses were conducted using SPSS for Windows ver. 18 (SPSS Inc., Chicago, IL, USA).

Results

Assessment of reliability

The total AUDIT-C score and scores for each AUDIT-C question demonstrated a high level of agreement between the repeated surveys (Table 1). Each index of agreement was close to 1. Therefore, we observed a high reproducibility of the AUDIT-C. However, the reproducibility of questions 2 and 3 of the AUDIT-C was relatively low compared to that of question 1 (Table 1).

Assessment of validity

The Spearman's correlation coefficient for the relationship between each question and the total score of the full AUDIT was 0.93 for question 1, 0.61 for question 2, and 0.67 for question 3. Table 2 provides the sensitivity, specificity, positive likelihood ratio, and Youden index of the AUDIT-C categorized by cutoff values of the full AUDIT score (≥8 points, ≥12 points, ≥16 points, and ≥20 points). The AUDIT-C cutoffs are ≥5 points for men and ≥3 points for women when the tool is used in Western countries. The sensitivity and specificity of these cutoffs for an AUDIT score ≥8 points were 88% and 80%, respectively, for men and 98% and 78%, respectively, for women. The sensitivity and specificity of the same cutoffs for an AUDIT score ≥12 points were 96% and 72%, respectively, for men and 96% and 76%, respectively, for women. The sensitivity and specificity of the same cutoffs for an AUDIT score ≥16 points were 100% and 66%, respectively, for men and 83% and 76%, respectively, for women.

A decrease in the positive likelihood ratio was observed with a higher AUDIT score, which indicates a more serious drinking problem. When the cutoffs used in Western countries were applied, the specificity was relatively low, and a trend for increased false positives was observed. According to the Youden index, the appropriate cutoffs for the AUDIT-C were ≥5 points for men and ≥4 points for women in this Japanese sample. Table 3 provides the sensitivity, specificity, positive likelihood ratio, and Youden index for identifying risky drinking. The same appropriate cutoffs were observed for identifying heavy drinking or binge drinking. However, the AUDIT-C demonstrated high sensitivity and specificity in women

Table 1. Reliability of the Alcohol Use Disorders Identification Test – Consumption (AUDIT-C)

Items	κ	α	Spearman's coefficient of correlation	ICC	95% C.I
AUDIT-1	0.866	0.985	0.971	0.971	(0.958–0.980)
AUDIT-2	-	0.907	0.833	0.831	(0.765–0.881)
AUDIT-3	-	0.909	0.836	0.831	(0.764–0.880)
AUDIT-C score	0.628	0.975	0.952	0.951	(0.930–0.966)

*α: Cronbach's alpha; CI: confidence interval; ICC: intraclass correlation coefficient

Table 2. Validity of the Alcohol Use Disorders Identification Test – Consumption (AUDIT-C) for Identifying Alcohol Use Disorders Categorized by AUDIT Cut-offs

	AUDIT ≥8 points					AUDIT ≥12 points					AUDIT ≥16 points					AUDIT ≥20 points				
	Se	Sp	PPV	LR+	Youden Index	Se	Sp	PPV	LR+	Youden Index	Se	Sp	PPV	LR+	Youden Index	Se	Sp	PPV	LR+	Youden Index
AUDIT-C cutoffs																				
Men																				
≥1 *point*	1.00	0.28	0.30	1.39	0.28	1.00	0.24	0.14	1.32	0.24	0.99	0.23	0.06	1.28	0.22	1.00	0.22	0.03	1.29	0.22
≥2 points	1.00	0.39	0.33	1.63	0.39	1.00	0.33	0.15	1.49	0.33	0.99	0.31	0.07	1.44	0.30	1.00	0.30	0.03	1.44	0.30
≥3 points	1.00	0.48	0.37	1.93	0.48	1.00	0.42	0.17	1.70	0.41	0.99	0.39	0.08	1.62	0.38	1.00	0.38	0.03	1.61	0.38
≥4 points	0.98	0.61	0.44	2.51	0.59	0.99	0.53	0.20	2.09	0.52	0.98	0.49	0.09	1.93	0.47	1.00	0.48	0.04	1.92	0.48
≥5 points	0.88	0.80	0.58	4.51	0.69	0.96	0.72	0.29	3.38	0.68	0.97	0.67	0.13	2.96	0.64	1.00	0.66	0.06	2.90	0.66
≥6 points	0.75	0.92	0.74	9.42	0.67	0.90	0.84	0.41	5.81	0.75	0.93	0.80	0.19	4.65	0.73	0.95	0.78	0.08	4.28	0.73
≥7 points	0.56	0.98	0.90	27.93	0.54	0.75	0.93	0.55	10.20	0.68	0.82	0.89	0.27	7.26	0.71	0.92	0.87	0.13	6.98	0.79
≥8 points	0.36	1.00	1.00	∞	0.36	0.56	0.97	0.72	20.81	0.53	0.67	0.95	0.38	12.24	0.62	0.79	0.93	0.19	11.27	0.72
≥9 points	0.22	1.00	1.00	∞	0.22	0.41	0.99	0.86	48.71	0.40	0.53	0.97	0.49	19.26	0.50	0.63	0.96	0.25	15.94	0.59
≥10 points	0.12	1.00	1.00	∞	0.12	0.25	1.00	0.93	102.70	0.24	0.37	0.99	0.63	33.42	0.36	0.50	0.98	0.35	26.31	0.48
≥11 points	0.05	1.00	1.00	∞	0.05	0.10	1.00	0.95	164.31	0.10	0.15	1.00	0.67	39.32	0.15	0.13	0.99	0.24	15.15	0.12
Area under the ROC curve (S.E.)																				
	0.932 (0.006)					0.939 (0.008)					0.930 (0.014)					0.949 (0.011)				
Women																				
≥1 point	1.00	0.48	0.07	1.91	0.48	1.00	0.46	0.02	1.87	0.46	1.00	0.46	0.01	1.86	0.46	1.00	0.46	0.00	1.85	0.46
≥2 points	0.99	0.65	0.10	2.84	0.64	0.96	0.64	0.03	2.64	0.60	0.92	0.63	0.01	2.50	0.55	0.83	0.63	0.01	2.25	0.46
≥3 points	0.98	0.78	0.15	4.52	0.76	0.96	0.76	0.05	4.10	0.73	0.92	0.76	0.02	3.84	0.68	0.83	0.76	0.01	3.43	0.59
≥4 points	0.96	0.87	0.23	7.68	0.84	0.96	0.85	0.08	6.57	0.82	0.92	0.85	0.03	6.05	0.77	0.83	0.84	0.01	5.37	0.68
≥5 points	0.86	0.96	0.46	22.03	0.82	0.93	0.94	0.17	15.82	0.87	0.92	0.94	0.08	14.29	0.86	0.83	0.93	0.03	12.35	0.77
≥6 points	0.69	0.99	0.64	46.59	0.68	0.82	0.97	0.26	27.16	0.79	0.92	0.97	0.13	26.39	0.89	0.83	0.96	0.06	21.93	0.80
≥7 points	0.46	1.00	0.80	100.24	0.46	0.75	0.99	0.43	59.33	0.74	0.92	0.98	0.24	55.63	0.91	0.83	0.98	0.10	42.37	0.81
≥8 points	0.37	1.00	1.00	∞	0.37	0.68	0.99	0.61	125.25	0.67	0.85	0.99	0.35	94.35	0.84	0.83	0.99	0.16	71.70	0.82
≥9 points	0.21	1.00	1.00	∞	0.21	0.50	1.00	0.78	276.88	0.50	0.62	1.00	0.44	137.23	0.61	0.67	0.99	0.22	106.52	0.66
≥10 points	0.10	1.00	1.00	∞	0.10	0.29	1.00	1.00	∞	0.29	0.31	1.00	0.50	171.54	0.31	0.50	1.00	0.38	223.70	0.50
≥11 points	0.08	1.00	1.00	∞	0.08	0.25	1.00	1.00	∞	0.25	0.31	1.00	0.57	228.72	0.31	0.50	1.00	0.43	279.63	0.50
Area under the ROC curve (S.E.)																				
	0.974 (0.007)					0.972 (0.016)					0.961 (0.034)					0.921 (0.069)				

*AUDIT-C: Alcohol Use Disorders Identification Test – Consumption; Se: sensitivity; Sp: specificity; PPV: positive predictive value; LR: positive likelihood ratio; ROC: receiver operating characteristics; S.E.: standard error

Table 3. Validity of the Alcohol Use Disorders Identification Test – Consumption (AUDIT-C) for Identifying Heavy Drinking and Binge Drinking

	Heavy drinking (M/F* ≥280/≥168 g/week)					Binge drinking (≥60 g ethanol ≥1 time/week)				
	Se	Sp	PPV	LR+	Youden Index	Se	Sp	PPV	LR+	Youden Index
AUDIT-C cutoffs										
Men										
≥1 point	0.99	0.26	0.19	1.33	0.24	0.99	0.24	0.11	1.29	0.22
≥2 points	0.99	0.35	0.22	1.52	0.34	0.99	0.33	0.12	1.46	0.31
≥3 points	0.99	0.44	0.24	1.75	0.42	0.97	0.40	0.13	1.62	0.37
≥4 points	0.99	0.55	0.29	2.20	0.54	0.95	0.51	0.15	1.94	0.46
≥5 points	0.89	0.74	0.38	3.37	0.62	0.85	0.69	0.20	2.73	0.54
≥6 points	0.70	0.85	0.45	4.57	0.55	0.72	0.81	0.26	3.78	0.53
≥7 points	0.53	0.92	0.55	6.67	0.45	0.58	0.89	0.33	5.37	0.47
≥8 points	0.36	0.97	0.65	10.45	0.33	0.45	0.95	0.45	8.84	0.40
≥9 points	0.24	0.98	0.71	13.62	0.22	0.35	0.98	0.59	15.21	0.33
≥10 points	0.15	0.99	0.78	19.35	0.14	0.25	0.99	0.76	33.67	0.25
≥11 points	0.06	1.00	0.86	33.17	0.06	0.09	1.00	0.67	21.35	0.08
Area under the ROC curve (S.E.)										
	0.880 (0.01)					0.857 (0.015)				
Women										
≥1 point	0.97	0.47	0.06	1.85	0.45	1.00	0.46	0.03	1.87	0.46
≥2 points	0.96	0.65	0.09	2.74	0.61	1.00	0.64	0.04	2.75	0.64
≥3 points	0.95	0.78	0.14	4.34	0.73	0.94	0.77	0.05	3.99	0.70
≥4 points	0.91	0.87	0.20	7.04	0.78	0.90	0.85	0.08	6.17	0.76
≥5 points	0.62	0.95	0.31	12.54	0.57	0.71	0.94	0.14	11.71	0.65
≥6 points	0.47	0.98	0.41	19.12	0.44	0.68	0.97	0.23	21.72	0.65
≥7 points	0.29	0.99	0.47	24.23	0.28	0.58	0.99	0.37	41.43	0.57
≥8 points	0.23	0.99	0.58	37.93	0.22	0.45	0.99	0.45	58.76	0.44
≥9 points	0.15	1.00	0.67	54.78	0.15	0.29	1.00	0.50	71.35	0.29
≥10 points	0.08	1.00	0.75	82.18	0.08	0.13	1.00	0.50	71.35	0.13
≥11 points	0.06	1.00	0.71	68.48	0.06	0.13	1.00	0.57	95.14	0.13
Area under the ROC curve (S.E.)										
	0.929 (0.015)					0.948 (0.015)				

*M/F: Male/Female; **AUDIT-C: Alcohol Use Disorders Identification Test – Consumption; Se: sensitivity; Sp: specificity; PPV: positive predictive value; LR: positive likelihood ratio; ROC: receiver operating characteristics; S.E.: standard error

for identifying high AUDIT scores and risky drinking, compared with men. The specificity of the AUDIT-C for identifying risky drinking was relatively low in men.

Discussion

To the best of our knowledge, this is the first study to determine the reliability and validity of the AUDIT-C in an Asian country. The high reproducibility of the AUDIT-C was confirmed in the present study. The validity of the AUDIT-C was also high in this Japanese sample. It has been reported that there are many people with alcohol dependence in Japan (Osaki et al., 2005). However, only a portion of these people see doctors according to the relatively low estimate of patients that visit medical facilities reported in a national patient survey (Osaki, 2013). However, the general belief is that the majority of patients with alcohol use disorders visit medical facilities or undergo health examinations because of prevalent physical and mental problems. With appropriate screening by physicians, brief interventions can be implemented with patients at risk of alcohol use disorders, resulting in reduced alcohol consumption. The availability of a simple screening test in busy clinics or health examination settings would enable brief intervention programs aimed at reducing alcohol consumption to be implemented with patients with suspected alcohol use disorders. The high reliability and validity of the AUDIT-C indicate its potential effectiveness, as a proxy questionnaire for the full AUDIT, for identifying alcohol dependence in the general population in Japan.

Furthermore, the AUDIT-C is also considered to be an effective screening test for identifying risky drinkers, owing to the observed reliability and validity of the AUDIT-C for identifying heavy drinking or binge drinking. The appropriate AUDIT-C cutoffs for identifying heavy drinking or binge drinking were the same as those

for identifying alcohol use disorders with the full AUDIT. The statistical analyses in the present study resulted in appropriate AUDIT-C cutoffs of ≥5 points for men and ≥4 points for women in Japan.

The cutoffs recommended for use in Western countries vary; however, the most commonly used cutoffs have been 4-6 points for men and 3-5 points for women (Bush et al., 1998; Nordqvist et al., 2004; Dawson et al., 2005; Gómez et al., 2006; Bradley et al., 2007; Rodriguez-Martos and Santamarina, 2007; Tuunanen et al., 2007; Frank et al., 2008; Kelly et al., 2009; Kaarne et al., 2010; Towers et al., 2011; Dawson et al., 2012; Crawford et al., 2013; Johnson et al., 2013). According to results from the United States and European countries, the AUDIT-C is a satisfactory screening tool for identifying alcohol dependence diagnosed by DSM-IV as binge drinking or heavy drinking with high sensitivity and specificity. One article indicated that the sensitivity of the AUDIT-C varies by race or ethnicity (Frank et al., 2008). The sensitivity and specificity of the AUDIT-C tend to be lower for specific populations, such as veterans or young patients in emergency services (Kelly et al., 2009; Crawford et al., 2013).

The results of the present study were similar to previous results. The sensitivity and specificity of the AUDIT-C for heavy drinking, binge drinking and the total AUDIT score in this Japanese sample were adequate compared to results from Western countries. Therefore, we could conclude that the use of the AUDIT-C as a screening test instead of the full AUDIT is appropriate in the Japanese population. The AUDIT-C can be used in primary health care and health examination settings to promote countermeasures for reducing alcohol-related disease burden and social problems in Japan. This indicates that AUDIT-C will be an useful tool for cancer prevention in Japan.

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References

Akobeng AK (2007). Understanding diagnostic tests 3: receiver operating characteristic curves. *Acta Paediatr*, **96**, 644-7.

Babor TF, Higgins-Biddle JC, Saunders JB, Monteiro MG, World health organization dept of mental health and substance dependence (2001). audit: the alcohol use disorders identification test: guidelines for use in primary health care. 2nd ed. World Health Organization, Geneva.

Bradley KA, DeBenedetti AF, Volk RJ, et al (2007). AUDIT-C as a brief screen for alcohol misuse in primary care. *Alcohol Clin Exp Res*, **31**, 1208-17.

Bush K, Kivlahan DR, McDonell MB, Fihn SD, Bradley KA (1998). The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. ambulatory care quality improvement project (ACQUIP). Alcohol Use Disorders Identification Test. *Arch Intern Med*, **158**, 1789-95.

Crawford EF, Fulton JJ, Swinkels CM, et al (2013). Diagnostic efficiency of the AUDIT-C in U.S. veterans with military service since September 11, 2001. *Drug Alcohol Depend*, **132**, 101-6.

Dawson DA, Grant BF, Stinson FS, Zhou Y (2005). Effectiveness of the derived alcohol use disorders identification test (audit-c) in screening for alcohol use disorders and risk drinking in the US general population. *Alcohol Clin Exp Res*, **29**, 844-54.

Dawson DA, Smith SM, Saha TD, Rubinsky AD, Grant BF (2012). Comparative performance of the AUDIT-C in screening for DSM-IV and DSM-5 alcohol use disorders. *Drug Alcohol Depend*, **126**, 384-8.

de Menezes RF, Bergmann A, Thuler LC (2013). Alcohol consumption and risk of cancer: a systematic literature review. *Asian Pac J Cancer Prev*, **14**, 4965-72.

Frank D, DeBenedetti AF, Volk RJ, et al (2008). Effectiveness of the AUDIT-C as a screening test for alcohol misuse in three race/ethnic groups. *Gen Intern Med*, **23**, 781-7.

Gómez A, Conde A, Santana JM, et al (2006). The diagnostic usefulness of AUDIT and AUDIT-C for detecting hazardous drinkers in the elderly. *Aging Ment Health*, **10**, 558-61.

Johnson JA, Lee A, Vinson D, Seale JP (2013). Use of AUDIT-based measures to identify unhealthy alcohol use and alcohol dependence in primary care: a validation study. *Alcohol Clin Exp Res*, **37**, 253-9.

Kaarne T, Aalto M, Koukkanen M, Seppa K (2010). AUDIT-C, AUDIT-3 and AUDIT-QF in screening risky drinking among Finnish occupational health-care patients. *Drug Alcohol Rev*, **29**, 563-7.

Kelly TM, Dnovan JE, Chung T, Bukstein OG, Cornelius JR (2009). Brief screens for detecting alcohol use disorder among 18-20 year old young adults inn emergency departments: comparing AUDIT-C, CRAFFT, RAPS4-QF, FAST, RUFT-Cut, and DSM-IV 2-item scale. *Addict Behav*, **34**, 668-74.

Nordqvist C, Johansson K, Bendtsen P (2004). Routine screening for risky alcohol consumption at an emergency department using the AUDIT-C questionnaire. *Drug Alcohol Depend*, **74**, 71-5.

Osaki Y, Matsushita S, Shirasaka T, Hiro H, Higuchi S (2005). Nationwide survey of alcohol drinking and alcoholism among Japanese adults. *Nihon Arukoru Yakubutsu Igakkai Zasshi*, **40**, 455-70.

Osaki Y, Higuchi S, Matsushita S, Kishimoto T (2012). Social costs of alcohol misuse in Japan. *Japanese Journal of Hygiene*, **67**, 320.

Osaki Y (2013). Trends in drinking behavior and alcohol-related disorders in Japan. *Progress I Medicine*, **33**, 803-7. Rodriguez-Martos A, Santamarina E (2007). Does the short form of the Alcohol Use Disorders Identification Test (AUDIT-C) work at a trauma emergency department? *Subst Use Misuse*, **42**, 923-32.

Towers A, Stephens C, Dulin P, et al (2011). Estimating older hazardous and binge drinking prevalence using AUDIT-C and AUDIT-3 thresholds specific to older adults. *Drug Alcohol Depend*, **117**, 211-218.

Tuunanen M, Aalto M, Seppa K (2007). Binge drinking and its detection among middle-aged men using AUDIT, AUDIT-C and AUDIT-3. *Drug Alcohol Rev*, **26**, 295-299.

WHO (2009). Global health risks: mortality and burden of disease attributable to selected major risks. World Health Organization, Geneva.

Yaegashi Y, Onoda T, Morioka S, et al (2014). Joint effects of smoking and alcohol drinking on esophageal cancer mortality in Japanese men: findings from the Japan collaborative cohort study. *Asian Pac J Cancer Prev*, **15**, 1023-9.

Youden WJ (1950). Index for rating diagnostic tests. *Cancer*, **3**, 32-5.

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ORIGINAL ARTICLE

A case–control study regarding relative factors for behavioural and psychological symptoms of dementia at a Canadian regional long-term extended care facility: a preliminary report

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Key words: *antidepressants, BPSD, cerebral vascular accident, comorbid major depression, dementia, past history of depression.*

Abstract

Background: Behavioural and psychological symptoms of dementia (BPSD) are prevalent and have an impact on the care of persons with dementia. Previous studies regarding predisposing factors have included pharmacotherapy, but other factors may not have been sufficiently studied. We hypothesized that psychotropic medications, past history, comorbid psychiatric disorders and other factors may be relevant factors related to BPSD.

Methods: Data were collected from patients' medical charts at an extended care facility over a 2-year period from 1 May 2008 to 30 April 2010. Information obtained included the presence of BPSD, gender, age, marital status, past history, comorbid psychiatric disorder and medication use. Patients were divided into two groups: a group with BPSD ($n = 29$) and a group without BPSD ($n = 10$). A binomial logistic regression analysis was performed for the above factors.

Results: Comorbid major depression was linked to BPSD (odds ratio = 12.57, 95% confidence interval: 1.31–120.74) as well as to the use of antidepressants (odds ratio = 6.49, 95% confidence interval: 1.02–41.25). There was a trend towards statistical significance in the relationship between greater use of antidepressants for the patients with comorbid major depression and the presence of BPSD. Past history of depression (Fisher's exact test; $P = 0.03$) and cerebral vascular accident (degrees of freedom = 1, $\chi^2 = 4.44$, $P = 0.04$) were linked to the presence of BPSD and comorbid major depression.

Conclusion: Accurate evaluation and treatment of comorbid major depression may affect BPSD. In order to reduce the burden of BPSD on patients and caregivers, there should be a careful and thoughtful diagnosis of comorbid major depression in patients with dementia.

INTRODUCTION

Dementia has become an increasing social burden in countries, such as Canada and Japan, that are facing a rapid demographic shift towards an ageing society. Behavioural and psychological symptoms of dementia (BPSD) represent a major focal point for this social burden.[1–3] Issues in the treatment, care, and support for persons with dementia are an ongoing concern.[2]

BPSD can be conceptualized as several clusters such as apathy, psychosis, behavioural change, and affective change. The affective cluster can include dysphoria, irritability, anxiety, and euphoria. Although it is difficult to clearly distinguish between comorbid major depression and depressive symptoms as a part of BPSD affective cluster in a clinical setting, both require appropriate treatment.

Studies suggest that BPSD is affected by the degree of cognitive impairment and living conditions prior to admission,[4] but research into BPSD has largely focused on pharmacological and non-pharmacological treatments to control BPSD.[5–7] In contrast, there is a paucity of research regarding specific risk factors for BPSD and its prevention.[6,8,9] There is some limited evidence in the literature that certain kinds of medications such as anxiolytics and hypnotics are more likely to contribute to the expression of BPSD symptoms, but a consensus view has not yet been reached.[5] Atypical antipsychotics and antidepressants are believed to be effective for the treatment of BPSD, but this is tempered by their risks and side effects.[10] Similarly, hypnotics are commonly prescribed in clinical practice for sleep disorder, which is a common co-occurring symptom of BPSD, yet the literature is unclear with respect to this treatment.[11]

Therefore, in this study, we examined the relationship between pharmacotherapy and BPSD, as well as other relevant potential risk factors of BPSD, within the context of a regional long-term extended care facility in Vancouver, BC, Canada.

METHODS

Participants

We conducted a retrospective chart review using a case–control method. The study protocol was approved by the research ethics committees of Vancouver Coastal Health (Vancouver, BC, Canada) and the University of British Columbia (Vancouver, BC, Canada) research ethics committee and was conducted in accordance with the Guideline for Good Clinical Practice and the principles of the Declaration of Helsinki. Participants included all patients 60 years of age or older with dementia who were referred from Banfield Pavilion (Vancouver, BC, Canada), a regional extended care facility of Vancouver General Hospital (Vancouver, BC, Canada), for a geriatric psychiatry consultation from 1 May 2008 to 30 April 2010. There were a total of 77 referrals during this period. Of these, 9 patients were excluded for being under 60 years of age and 29 patients were excluded for not having a diagnosis of dementia. This left 39 patients in total. This group was divided into patients with BPSD who served as cases and patients with dementia but not BPSD who served as controls. In this study, the non-BPSD group included dementia patients without any symptoms of BPSD who were referred to a geriatric psychiatrist for competency assessment. When patients with dementia developed one and more symptoms of BPSD (dysphoria, agitation, paranoia, anxiety, disinhibition, and others) were referred, we considered them part of the BPSD group.

There is ambiguity regarding the difference between comorbid major depression and depressive symptoms as a part of the BPSD affective cluster. Therefore, we considered it as comorbid major depression only when the term of depression was clearly noted as a diagnosis that fulfilled the fourth edition of the Diagnostic and Statistical Manual of Mental Health Disorders (DSM-IV-TR) criteria for major depressive episode. In addition, patients were considered to have depressive symptoms as a part of the BPSD affective cluster when they did not fulfil criteria for major depression but their mood was sufficiently disabling.

Three sources of data for the chart review were used: (i) the physical chart maintained at Banfield Pavilion; (ii) the psychiatric consultation notes; and (iii) the patient care information system (a regional patient database maintained by Vancouver General Hospital). These data sources contained case histories, hospitalizations, registrations, referrals, assessments, case notes, care plans, and scheduling of ongoing treatment information.

Data collection

A patient medication and history instrument was developed. The instrument contained sections for: (i) demographics (including gender, age, marital status, previous living situation); (ii) past medical history; (iii) the use of psychotropic medication, cognitive enhancers and opioids; (iv) past psychiatric history; (v) substance use history; (vi) the presence of pain; (vii) a Mini-Mental State Exmaination (MMSE) proximate score;[12] (viii) dementia type; and (ix) a co-morbid axis I psychiatric disorder. DSM-IV-TR was used to make the diagnosis of psychiatric disorders. Although dementia with Lewy bodies was not recognized in DSM-IV-TR, we used this diagnosis for subtyping dementia.

The data were collected by a psychiatric fellow (one of the co-authors of the study) from 1 May 2010 to 31 August 2010 and entered into Excel (Microsoft, Redmond, WA, USA). As BPSD was the selection criteria for inclusion in the review, the data could not be collected in a blind manner.

Statistical analysis

Data were screened for normality, homogeneity of variance, and outliers. Categorical variables were compared with a χ^2 test and Fisher's exact test. Student's *t*-test was used for continuous variables. Correlations analyses were performed for items that emerged as statistically significant and clinically important. Pearson's correlation coefficient was obtained for normally distributed variables, and Spearman's correlation coefficient was obtained for category variables. Statistical significance was set at $P < 0.05$, two-tailed. For Fisher's exact test, statistical significance was set at $P < 0.05$, one-tailed. Statistically significant correlations with a value >0.5 were considered relevant. Binominal logistic regression analysis was performed with BPSD as the dependent variable, and statistically and clinically significant variables were covariates. All statistical analyses were conducted using SPSS version 18.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

Demographic and clinical characteristics of the sample are presented in Table 1. There were 29 patients (12 men, 17 women) with a diagnosis of BPSD and 10 patients (5 men, 5 women) with dementia but no BPSD. The mean ages of the BPSD group and non-BPSD were 82.1 ± 9.0 years and 77.8 ± 9.5 years, respectively. Mean value for MMSE scores were 15.8 for the BPSD group and 13.9 for the non-BPSD group. In the BPSD group, there were 14 patients with Alzheimer's/vascular mixed dementia, 10 patients with vascular dementia, 3 patients with dementia with Lewy bodies, 1 patient with dementia of the Alzheimer's type and 1 patient with dementia due to Parkinson's disease. In the non-BPSD group, there were five patients with Alzheimer's/vascular mixed dementia and five patients with vascular dementia. Agitation/aggression was the most common symptom of BPSD, followed by dysphoria/depressive symptom, anxiety, paranoia and others. No statistically significantly differences were found between groups for age or MMSE score. Although there were a few patients who were administered antipsychotics and/or antidepressants in the non-BPSD group, we tried to exclude patients from this group who had achieved remission from BPSD with those medications. From their medical charts, these patients likely had past history of depression, past history of psychosis, or past history of alcohol dependence prior to the incidence of dementia.

Table 1 Demographic and clinical characteristics

	Without BPSD (n = 10)	With BPSD (n = 29)
Age, mean ± SD (years)	77.8 ± 9.5	82.1 ± 9.0
Gender (n)		
Men	5 (50.0%)	12 (41.4%)
Women	5 (50.0%)	17 (58.6%)
MMSE, mean ± SD	13.9 ± 7.2	15.8 ± 7.9
Comorbidity of major depression (n)	1 (10.0%)	15 (51.7%)
Antipsychotics (n)	4 (40.0%)	16 (55.2%)
Antidepressants (n)	3 (30.0%)	18 (62.1%)
Hypnotics (n)	4 (40.0%)	17 (58.6%)

BPSD, behavioural and psychological symptoms of dementia; MMSE, Mini-Mental State Examination.

Correlation coefficients were calculated for demographic variables (gender, age) and relevant clinical variables (MMSE scores; use of hypnotics, antipsychotics or antidepressants; and presence of comorbid major depression) based upon previous literature.[6] No statistically significant correlations emerged between variables using the >0.5 criteria. Age and gender (r = 0.50), as well as comorbid major depression and the use of antidepressants (r = 0.46), reached significance.

Because the sample size was small, an exploratory binominal logistic regression analysis was performed; the presence of BPSD was the dependent variable, and gender and age were the covariates. Five other variables were added separately as covariates: MMSE score, presence of comorbid major depression, presence of antipsychotics, presence of antidepressants, and presence of hypnotics (Table 2). Results indicated that only comorbid major depression (odds ratio = 12.57, 95% confidential interval: 1.31–120.74) and the use of antidepressants (odds ratio = 6.49, 95% confidential interval: 1.02–41.25) produced a statistically significant odds ratio for the presence of BPSD (Table 2).

As comorbid major depression and antidepressant use are related factors, we analyzed them for the presence or absence of BPSD using Fisher's exact test (Table 3). Results indicated there was a trend towards statistical significance between the presence of BPSD and patients with comorbid major depression who are treated with antidepressants (P = 0.07).

We considered the related factors that were linked to the presence of BPSD and comorbid major depression. First, we investigated the impact of past history of depression on the presence of BPSD and comorbid

major depression. There was a statistically significant difference between past history of depression ($P = 0.03$) in Fisher's exact test. Next, we considered that cerebral vascular accident could be the relative factor of the presence of BPSD and comorbid major depression. A statistically significant difference was found in a χ^2 test between past history of cerebral vascular accident (degrees of freedom = 1, χ^2 value = 4.44 $P = 0.04$) and the presence of BPSD with comorbid major depression (Table 4).

Table 2 Results of binominal logistic regression analyses of variables for the presence of BPSD

	Odds ratio	95%CI	*P*-value
Model 1			
Gender	0.86	0.14–5.18	0.87
Age	1.06	0.96–1.17	0.24
MMSE	1.04	0.94–1.14	0.48
Model 2			
Gender	0.53	0.08–3.70	0.52
Age	1.09	0.98–1.21	0.12
Comorbidity of major depression	12.57	1.31–120.74	0.03
Model 3			
Gender	0.83	0.14–4.97	0.84
Age	1.06	0.96–1.17	0.26
Antipsychotics	1.77	0.40–7.93	0.45
Model 4			
Gender	1.09	0.17–6.85	0.93
Age	1.09	0.98–1.22	0.13
Antidepressants	6.49	1.02–41.25	0.047
Model 5			
Gender	1.07	0.16–7.10	0.95
Age	1.06	0.96–1.18	0.25
Hypnotics	2.63	0.52–13.19	0.24

BPSD, behavioural and psychological symptoms of dementia; CI, confidence interval.

DISCUSSION

In this retrospective chart review, explicit cases of BPSD were analyzed and compared to non-BPSD cases. A relationship was found between comorbid major depression, the use of antidepressants, and the presence of BPSD. This is consistent with the research conducted by Steinberg *et al.*, which has shown that depression and delusions continue for an extended period in BPSD patients and therefore may require pharmacotherapy.[13]

There was a significant but weak relationship between comorbid major depression and antidepressant use. Although there was no statistically significant difference in the relationship between greater use of antidepressants for patients with comorbid major depression and BPSD, there was a marginal trend towards statistical significance. Several explanations of this finding are possible. BPSD has an affective cluster which includes dysphoria, irritability, anxiety, and euphoria. Differentiating between BPSD and depression can be difficult. Furthermore, the BPSD affective cluster is more often treated with antidepressants because of the risk associated with antipsychotic medications. Therefore, BPSD and major depression are more likely to be associated with anti-

Table 3 Presence of both comorbidity of major depression and antidepressants as well as the presence of BPSD

	With comorbidity of major depression Without antidepressants		With comorbidity of major depression With antidepressants		Without comorbidity of major depression With antidepressants		Without comorbidity of major depression Without antidepressants		Total	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Without BPSD	0	0	1	10	2	20	7	70	10	100
With BPSD	3	10.3	12	41.4	6	20.7	8	27.6	29	100
P-value	0.40		0.07		0.67		0.02			

BPSD, behavioural and psychological symptoms of dementia.

Table 4 BPSD with or without major depression versus past history of depression and cerebral vascular accident

	BPSD without major depression ($n = 14$)		BPSD with major depression ($n = 15$)		
	n	%	*n*	%	*P*-value
Past history of cerebral vascular accident	3	21.4	9	60.0	0.04
Past history of depression	2	14.3	8	53.3	0.03

BPSD, behavioural and psychological symptoms of dementia.

depressant use, given the presumption that the antidepressant can cover both the symptoms of BPSD and major depression. Behaviourally disturbed patients with major depression labelled as BPSD are also treated with antidepressants, whereas those with apathetic major depression are unlikely to be labelled as BPSD even though apathy is a cluster of BPSD. Patients are more likely to come to psychiatric attention if the behavioural disturbance causes psychological distress. This result would suggest that accurate evaluation and treatment of depressive symptoms will affect both the diagnosis and outcome of BPSD patients.

Given that depressive symptoms could be viewed as a part of the BPSD affective cluster, we carefully tried to identify depression as a diagnosis of comorbid major depression. As this study demonstrated that past history of depression as well as cerebral vascular accident are linked to the presence of BPSD and comorbid major depression, these factors give us a clue to find and treat depressive patients with dementia.

Although depression may be considered a symptom of BPSD according to International Psychogeriatric Association definition,[14] there is a tradition in research and management of dementia in identifying and treating major depression co-occurring in the context of dementia. Previous studies have specifically described these as co-occurring and not just labelling it as BPSD. There are specific assessment scales, such as the Cornell Scale for Depression in Dementia, and targeted therapies to try to address this issue.[15,16]

The International Psychogeriatric Association definition of BPSD is very broad in encompassing any demented individual with depressed mood with or without associated features leading to a diagnosis of major depression. However, this study aimed to formally identify those with major depression according to the DSM-IV-TR criteria in the BPSD cohort because those with a diagnosis of BPSD may not have merely a mood disturbance. Also, our data and sub-analyses suggest that those BPSD patients with major depression and comorbid dementia have higher rates of cerebrovascular events and past major depression based (Table 4).

There are limitations to the methodology of the present study that should be pointed out. First, the sample size was limited to a non-randomized and unblinded sample of 39 patients. Therefore, the results of the present study cannot be generalized beyond the sample and might not be conclusive. Next, no causal relationship can be determined because of the study's retrospective methodology. There is another limitation relating to the difficulty in distinguishing whether the patient had a history of depression prior to the onset of dementia. Finally, there was no data regarding a scale to measure BPSD in this study.

Future research should focus on a prospective study design with a well-validated objective scale for BPSD to further examine the causal factors that lead to the development of BPSD.

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REFERENCES

1 Conn D, Thorpe L. Assessment of behavioral and psychological symptoms associated with dementia. *Can J Neurol Sci* 2007; **34**: S67–S71.
2 Matsumoto N, Ikeda M, Fukuhara R *et al*. Caregiver burden associated with behavioral and psychological symptoms of dementia in elderly people in the local community. *Dement Geriatr Cogn Disord* 2007; **23**: 219–224.
3 Shaji KS, George RK, Prince MJ, Jacob KS. Behavioral symptoms and caregiver burden in dementia. *Indian J Psychiatry* 2009; **51**: 45–49.
4 Tunis SL, Edell WS, Adams BE, Kennedy JS. Characterizing behavioral and psychological symptoms of dementia (BPSD) among geropsychiatric inpatients. *J Am Med Dir Assoc* 2002; **3**: 146–151.
5 McKeith I, Cummings J. Behavioural changes and psychological symptoms in dementia disorders. *Lancet Neurol* 2005; **4**: 735–742.
6 Borroni B, Costanzi C, Padovani A. Genetic susceptibility to behavioural and psychological symptoms in Alzheimer disease. *Curr Alzheimer Res* 2010; **7**: 158–164.
7 Craig LA, Hong NS, McDonald RJ. Revisiting the cholinergic hypothesis in the development of Alzheimer's disease. *Neurosci Biobehav Rev* 2011; **35**: 1397–1409.
8 Sato N, Ueki A, Ueno H, Shinjo H, Morita Y. Dopamine D3 receptor gene polymorphism influences on behavioral and psychological symptoms of dementia (BPSD) in mild dementia of Alzheimer's type. *J Alzheimers Dis* 2009; **17**: 441–448.
9 Harwood DG, Ownby RL, Baker WW, Duara R. The behavioral pathology in Alzheimer's Disease Scale (BEHAVE-AD): factor structure among community-dwelling Alzheimer's disease patients. *Int J Geriatr Psychiatry* 1998; **13**: 793–800.
10 Schneider LS, Dagerman KS, Insel P. Risk of death with atypical antipsychotic drug treatment for dementia: meta-analysis of randomized placebo-controlled trials. *JAMA* 2005; **294**: 1934–1943.

11 Locca JF, Bula CJ, Zumback S, Bugnon O. Pharmacological treatment of behavioral and psychological symptoms of dementia (BPSD) in nursing homes: development of practice recommendations in a Swiss Canton. *J Am Med Dir Assoc* 2008; **9**: 439–448.
12 Hartmaier SL, Sloane PD, Guess HA, Koch GG, Mitchell CM, Phillps CD. Validation of the Minimum Data Set Cognitive Performance Scale: agreement with the Mini-Mental State Examination. *J Gerontol A Biol Sci Med Sci* 1995; **50**: M128–M133.
13 Steinberg M, Tshanz JT, Corcoran C *et al*. The persistence of neuropsychiatric symptoms in dementia: the Cache Country Study. *Int J Geriatr Psychiatry* 2004; **19**: 19–26.
14 International Psychogeriatric Association (IPA). Behavioral and psychological symptoms of dementia (BPSD) educational pack. [Cited 8 November 2013] Available from URL: http://www.ipa-online.net/pdfs/1BPSDfinal.pdf
15 Banerjee S, Hellier J, Dewey M *et al*. Sertraline or mirtazapine for depression in dementia (HTA-SADD): a randomized, multicentre, double-blind, placebo-controlled trial. *Lancet* 2011; **378**: 403–411.
16 Chemerinski E, Petracca G, Sabe L, Kremer J, Starkstein SE. The specificity of depressive symptoms in patients with Alzheimer's disease. *Am J Psychiatry* 2001; **158**: 68–72.

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WHO 世界戦略を踏まえたアルコールの有害使用対策に関する総合的研究
（研究代表者　樋口　進）

平成 26 年度分担研究報告書
外傷・死亡と飲酒との関係に関するデータ収集と解析

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研究要旨
日本において外傷と飲酒の関係に関する明確なデータがない。海外のデータでは外傷の 20%から 30%が飲酒に関連していると報告されていることから、飲酒率が高い日本においても外傷の相当数が飲酒に関連していることが予想される。また、飲酒関連死についてのデータもないが、これについても諸外国のデータからは相当数にのぼることが予想される。そこで、この研究では外傷と飲酒の関係に関するデータを集積し、日本における外傷と飲酒の関連を明らかにすることを目的とした。死亡者における外傷スコアと体内アルコール濃度の関係は濃度依存性に上がる傾向があること、概算で飲酒関連死が 6～7 万人という数字も議論はあるところではなるが見積もられた。今後は救急外来における外傷と飲酒の関係を明らかにする。

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1．はじめに

わが国において、外傷と飲酒の関係については、未だ明確なデータがない。諸外国についてはすべての外傷死の 20%から 30%が飲酒に関連していると報告されている[1) 2)]。それらの報告によれば、故意の損傷では 12.8%が飲酒に関連しており、不慮の損傷では 28.3%が飲酒に関連していると されている[3)]。したがって、海外のデータから、わが国においても外傷の相当数に飲酒が関連していることがわかる。わが国の少ない報告例において、東京都 23 区内の非犯罪死体を取り扱っている東京監察医務院報告では 40%が体内からアルコールが検出された[4)] としている。また、犯罪あるいは変死体の司法解剖例では 4 分の 3 からアルコールが検出されたという報告[5)] もなされており、少なくとも日本人の死因にも関わっていることが予想される。一方、WHO の共同研究では、16 カ国の救急外来での受傷患者解析について受傷前 6 時間以内に飲酒している割合が 20.9%になることを報告し[6)]、Kuendig らも受傷前 6 時間以内の飲酒が外傷の 24.7%であることを報告している[7)]。これらから、欧米において救急医療で受診者の 2 割程度が飲酒関連であることが明らかとなった。しかしながら、諸外国に比べ、アルコール代謝酵素多型でアルコール代謝活性が諸外国と比較して決して早

くないわが国[8]において、外傷死との関連、救急医療での関連については未だ明らかではない[9]。また、飲酒と暴力の関係においても不明である。そこで、本分担研究では、外傷および死因と飲酒の関係を明らかにする目的で、死因と外傷との関係については、死亡例についてアルコール検査をルーチンで行っている全国の法医学教室にて法医解剖例における外傷と体内アルコール濃度との解析を行うこととした。また、わが国の救命救急センターにおける受診者の飲酒との関連について米国の NIAAA の協力を得て WHO の共同研究でのプロトコールに従って実態・解析を行うこととしている。

２．方法

A．死亡例におけるアルコールと外傷

１）対象者

対象は、札幌医科大学、東京医科歯科大学、三重大学、大阪大学、奈良県立医科大学、香川大学、山口大学、熊本大学の各法医学教室および大阪府監察医事務所における解剖時の記録で、対象年度は平成２４年１月１日～平成２７年１２月３１日である。各施設において、各記録にあるすべての外傷をＡＩＳ９０に則りスコア化してＩＳＳスコアを算出、アルコール検査記録から濃度、そして死因を抽出して連結可能匿名化した基本データとする。各施設のデータは大阪大学法医学教室に集積し臨床統計を行うデータセンターとともに全体の解析を行うこととした。この研究については倫理指針に則って大阪大学附属病院臨床倫理審査委員会に申請してある。

B．救急医療における飲酒の影響

１）対象者

対象は、救命救急センターを外傷が原因で受診し、本研究への参加を同意した 20 歳以上の者で、受傷してから６時間以内に救急外来を訪れた患者を対象とする。実施場所は市立函館病院救命救急センターと他２施設を予定した。その施設を受診する者を代表するようにサンプリングを行う。外来が混み合い、研究の遂行が困難な場合には、対象者を受診者２名に１名、３名に１名などとすることも可能とする。なお、各施設でのデータ収集は最低５００名とし、実施体制は図１のとおりである。現在、北海道の市立函館病院救命救急センターが本プロジェクトへの参加を表明しており、参加病院においては、NIAAA の協力を得て２日～３日のワークショップを開催しプロトコールの内容理解と実践演習を行う。平成 23 年１月から平成 27 年 12 月の５年間で進めている。得られたデータおよび血液、DNA 等の検体は研究終了後５年間保存し、以後廃棄する。

２）研究方法

2-1）調査員

原則的に２名の調査員（調査員 A、調査員 B）を研究のために割り当てる。

2-2）調査票等

調査票はすでに国際共同研究で使用されている英語版調査票を邦訳して使用する（添付文書）。呼気中アルコール濃度測定にはアルコールセンサーを使用して測定する。

2－3）調査手順

① まず、調査員 A が、被験者の選択、研究の説明、患者からの同意取得を行う。同意取得に関しては、研究の説明文書、遺伝子研究の補足説明文書を使用する。また、同意の取得には「けがと飲酒に関する国際共同研究協力同意書」を使用する。

② その後、調査員 B が、まずアルコセンサーで呼気中アルコール濃度の検査を行う。次いで調査票に従って面接調査を行う。その主な内容は以下の通りである。

i) 受傷に関する質問

どのように受傷したかについてのいくつかの質問を行う。その際、自傷によるものなら確認する。暴力によるものなら、加害者が誰か、飲酒していたかを質問する。受傷時にどこにいたか、何をしていたかを質問する。

ii) けがをする直前の飲酒

受傷、事故の前 6 時間以内に飲酒したかどうか、もし飲酒していれば、飲酒した時間、何をどれくらい飲んだか、どこで飲んだか、どれくらい酔っていたか、受傷によって飲酒を中止したかどうか、受傷から受診前までに飲酒したかについて尋ねる。

iii) いつもの酒の飲み方

最近 1 年間の飲酒について、思い出してもらい質問をする。普段の飲酒の頻度、量、12 ドリンク以上飲酒した日の回数、5-11 ドリンク飲酒した日の回数を尋ねる。また、アルコール依存症についての質問、同じ効果を得るために飲酒量を増やす必要があったかどうか、飲酒によって何回怪我をしたか、治療を要する怪我が何回あったかを尋ねる。

iv) けがの前日の飲酒

前日のけがをしたのと同じ時刻にどこにいたか、何をしていたか、もし飲酒していたなら何をどれくらい飲んだかを質問する。

v) けがのちょうど 1 週間前の飲酒

1 週間前のけがをしたのと同じ時刻にどこにいたか、もし飲酒していたなら何をどれくらい飲んだかを質問する。

vi) 飲酒後の反応

飲酒後のフラッシング反応について質問する。

vii) 背景情報

教育歴、仕事についているかを尋ねる。患者が嫌がらなければ、収入を尋ねる。

2－4）採血（オプション）

遺伝子解析について同意を得られた場合において、ADH (alcohol dehydrogenase)、ALDH2 (aldehyde dehydrogenase-2) 等の遺伝子のタイピングを行うための採血を行う。

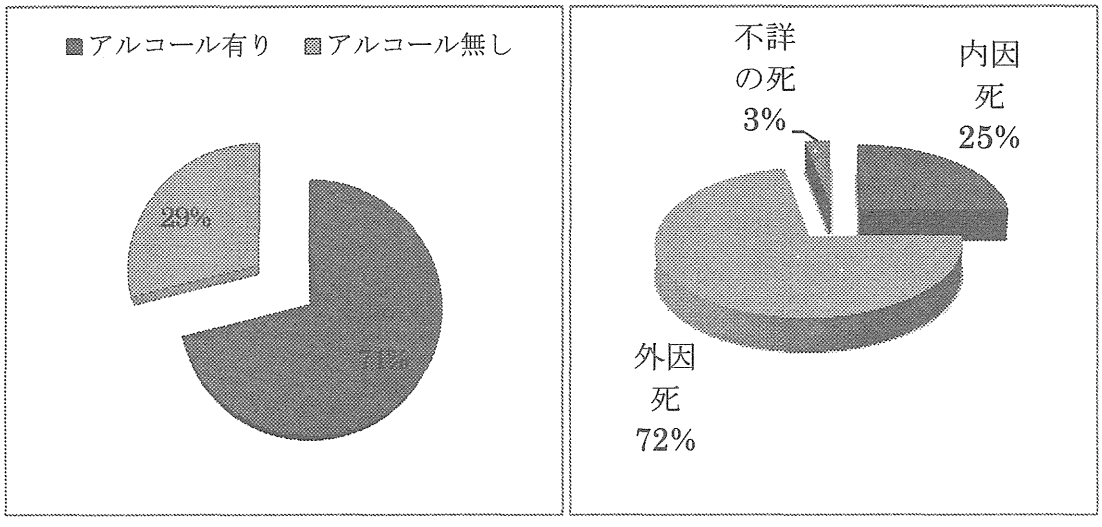
3）プロコールについては、添付資料を掲載した。国際共同研究に用いられたプロトコールを久里浜アルコール症センターで翻訳したものを使用する。

4）以上の研究については、平成２２年度に久里浜アルコール症センター遺伝子倫理委員会、札幌医科大学倫理委員会の承認を、平成２３年度には市立函館病院救命救急センター、大阪府立泉州救命救急センターの承認をすでに得ている。平成２７年度については平成２７年４月１日に施行された新

しい倫理指針に則り多施設共同研究を大阪大学附属病院臨床研究倫理審査委員会に申請中である。

３．現在の状況と予想される結果

死因における外傷と飲酒の関係については２０１２年～２０１５年の全国９施設における多施設共同研究を行う。４法医学教室の記録データからは、下記の図１に示すように、体内からアルコールが検出された例の割合は７１％となった。こののことは体内にアルコールが検出された場合をアルコール関連死 alcohol-related death とすると７割がアルコール関連死としてよい。これら４施設の心については、７２％が外因死で、２５％における外傷と飲酒の関係は有意に飲酒者において外傷受傷が増加することが認められている。



A．アルコール検出割合　　B．死因の割合

図１　４施設におけるアルコール検出の割合（A）と内外因死の割合（B）

上記、図１は法医学教室のデータであるため、犯罪死体および変死体として取り扱われた解剖のデータＢの死因については日本の死因統計と比較し外因死が非常に多い。そこで、非犯罪死体を取り扱っている大阪府監察医事務所のデータを下記の図２に示す。

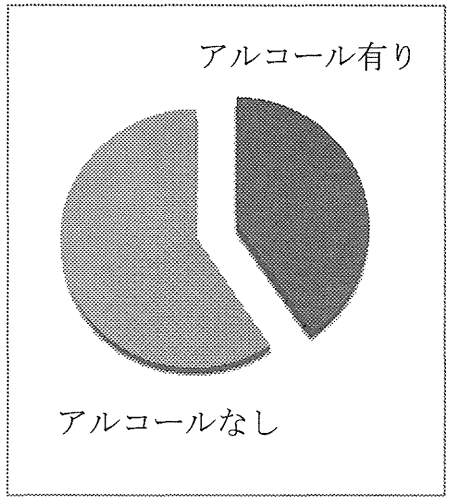


図２　非犯罪死体における体内アルコール検出の割合（大阪府監察医事務所）

この研究によって初めてわが国の救急医療の外傷患者おける飲酒の実際が明らかになるとともに死亡例における飲酒のおよぼす影響がはじめて明らかになる。このことはWHOにデータ提供等を行えるとともに、諸外国との比較はもとより、医療行政施策における飲酒対策ももちろんのこと、他の行政機関の飲酒対策の施策に役立つものと期待される。

実施施設として市立函館病院救命救急センターについては、すでに平成22年９月２７日から３日間ワークショップを開催済みである。その内容はNIAAAのChou博士によるレクチャーとワークショップであり。平成２３年度からは実施施設として、市立函館病院救命救急センター、大阪府立泉州救命救急センターでの臨床研究が承認され、実施中である。ただ、これらの施設において問題点が浮かび上がってきた。救急外来において最も多いの内因性の疾患であること、外傷事例が極めて少ないことである。NIAAAの共同研究基準つまり一施設５００例を満たすには数年以上かかる可能性が出てきた。そこで、外国と異なり日本においては施設間差違が少ないことから大阪府を中心にさらなる多施設共同研究を検討中である。

文献

１）Honkanen, R. (1993) Alcohol in home and leisure injuries. Addiction, 88, 939–944.

２）Cherpitel, C.J. (1993) Alcohol and injuries: a review of international emergency room studies. Addiction, 88, 923-937.

３）Room, R., Babor, T. & Rehm, J. (2005) Alcohol and public health. Lancet, 365, 519–530.

４）水上創．薬毒物と死．第12回東京都監察医務院公開講座　平成16年10月23日．http://www.fukushihoken.metro.tokyo.jp/