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Original Article

General Consumer Awareness of Warnings Regarding the Consumption of Alcoholic Beverages

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Over the past two decades, the liquor industry in Japan has strived to address alcohol-related problems through initiatives such as warnings in the various media. In this study, we conducted an Internet-based questionnaire survey to examine general consumer awareness of such warnings, and the media by which they are conveyed, on the consumption of alcoholic beverages. A total of 985 subjects (males: 487, females: 498) in age groups ranging from 20s to 70s responded (response rate: 22.4%). The awareness rates for warnings regarding underage drinking, drunk driving, and drinking during pregnancy, and those for messages encouraging moderation in drinking, were 96.4%, 83.7%, 59.6%, and 45.5%, respectively. Logistic regression analysis adjusted for habitual alcohol consumption demonstrated significant gender- and/or age-based differences in the rates of awareness of warnings and the media publicizing them. For example, the odds ratio of awareness among women of warnings against underage drinking was significantly higher than that of awareness among men. Issues that must be addressed in the future include: (1) increasing public awareness about messages regarding drinking during pregnancy and drinking in moderation; (2) reviewing the wording of warnings to make them more effective; and (3) devising and employing, on a regular basis, more effective means of transmitting messages in consideration of gender and age.

Key words: alcoholic beverages, warnings, consumer awareness, Internet-based survey

The drinking of alcoholic beverages is a widespread source of individual and social pleasure in most countries around the world. However, some drinking patterns can lead to serious physical, mental, and social harm, including both chronic health consequences (such as toxic effects on the liver, heart, and other organs) and acute outcomes (such as traffic accidents, injuries, and alcohol poisoning) [1]. It was

also indicated that 4% of the global burden of disease was attributable to alcohol, which is similar to the percentages of global deaths and disabilities attributable to tobacco and hypertension [2]. The World Health Organization (WHO) stated that an effective strategy for reducing drinking among young people is to regulate the marketing of alcoholic beverages, including a ban on advertising practices that influence young people [3]. To reduce or solve alcohol-related problems, initiatives taken by alcoholic beverage vendors as well as studies and interventions in the field of medicine are essential [4]. Starting in December 1988, alcoholic beverage vendors have

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attempted to solve alcohol-related problems by enforcing the Self-Regulatory Code of Advertisement Practices and Container Labeling for Alcoholic Beverages <<http://www.sake-net.or.jp/pdf/koukokuj-e.pdf> accessed Feb. 5, 2010, in Japanese and English>. They have also revised this code (ninth revision in January 2008) to take international trends into account.

In 1989, the Japan Liquor Industry Council, which addresses and examines social issues related to the liquor industry in general and notifies members of its resolutions, requested that member companies include warnings against underage drinking in their advertisements. Since then, messages such as "Underage drinking is prohibited by applicable laws" and "Alcoholic beverages may be consumed by those aged 20 and over" have been included in all types of advertisements of alcoholic beverages [4]. In the current self-regulatory code, in addition to warnings against underage drinking, warnings concerning alcohol and health-related issues, specifically messages against drunk driving, drinking during pregnancy, and drinking in moderation, are stipulated [5].

In the U.S., in conformity with the Alcohol Beverage Labeling Act, the following warnings are required on the labels of alcoholic beverage containers manufactured since November 1989: "Government Warning: (1) According to the Surgeon General, women should not drink alcoholic beverages during pregnancy because of the risk of birth defects. (2) Consumption of alcoholic beverages impairs your ability to drive a car or operate machinery, and may cause health problems". In addition, awareness of such warning labels among consumers and the effects of this awareness on consumers have been examined [6-9]. In Japan, during the abovementioned corporate social responsibility activities undertaken by the liquor industry over the past 20 years, no survey has been conducted to examine how effective such activities have been with the public. In the present study, we conducted an Internet-based questionnaire survey to examine the rates of awareness of warnings about drinking, and of the media responsible for conveying such messages, among the general populace of Japan in order to improve guidelines for future activities.

Materials and Methods

The task of conducting an Internet survey was entrusted to NTT Resonant Inc., which carried out the survey from October 1 to 4, 2008. A questionnaire was distributed only once to a total of 4,400 people (males: 1,980, females: 2,420) who had been selected randomly from approximately 570,000 nationwide registered monitor members of goo Research, Business Platform Division of NTT Resonant Inc., according to the age component ratios. If several members of a family were registered members, the questionnaire was distributed to only one member of each family.

As an ethical consideration, the subjects were notified that their participation in the survey was voluntary, and that they would be considered to have given informed consent once a response from them had been received. For these analyses, only non-relinkable anonymized data, from which personal identification information had been eradicated, were used.

The questionnaire asked the following:

- (1) Had the participant seen warnings, such as "Alcoholic beverages may be consumed by those aged 20 and over," and "Alcohol is for those who have turned 20 years old" or the STOP symbol against underage drinking?
- (2) Had the participant seen warnings against drunk driving, such as "Drinking and driving is prohibited by law"?
- (3) Was the participant aware of warnings against drinking during pregnancy, such as "Drinking alcohol during pregnancy or nursing may adversely affect the development of your fetus or child"?
- (4) Was the participant aware of messages encouraging moderation in drinking, such as "Drink in moderation"?

In addition, the survey asked participants about their awareness of the media that deliver warnings about underage drinking and drunk driving (multiple answers permitted). The possible options were containers, television, newspapers, and posters. With regard to habitual alcohol consumption, those respondents who answered affirmatively to the question of whether they usually consumed alcoholic beverages were classified as habitual drinkers, and those who answered negatively were classified as not consuming alcohol habitually.

The rates of awareness of (1) messages regarding underage drinking, drunk driving, drinking during pregnancy, and moderation in drinking and (2) the media that publicized such warnings were then calculated. After adjusting the presence or absence of awareness for the presence or absence of subjects' habitual alcohol consumption, logistic regression analysis was performed using gender and age groups (20s-30s, 40s-50s, and 60s-70s) as explanatory variables.

The significance level was set at 5%. SPSS 16.0J for Windows was used for statistical analyses.

Results

The gender- and age-based number of respondents and the rate of response to the Internet survey are shown in Table 1. Respondents in their 20s/30s accounted for 54.8% of the total among males and females. The average ages (\pm standard deviation) for males and females were 40.6 (\pm 12.6) and 40.0 (\pm 12.3) yrs, respectively. No significant gender-based age difference was observed (Mann-Whitney U test; $p = 0.418$). A total of 985 people (males: 487, females: 498) responded. The response rates for males, females, and the total were 24.6%, 20.6%, and 22.4%, respectively. For both males and

females, the response rates for people in their 40s/50s and 60s/70s were higher than the response rate for people in their 20s/30s.

The percentages of habitual drinkers among males and females were 70.0% and 62.0%, respectively, the difference being significant (χ^2 test; $p = 0.008$).

Table 2 shows the results of a logistic regression analysis with regard to the rates of awareness of warnings about the consumption of alcoholic beverages. The rates of awareness of warnings about

Table 1 Numbers of respondents to the Internet survey based on gender and age

Age	N ^a	Respondents (%)	Rr ^b (%)
Men			
20-39	1,320	267 (54.8)	20.2
40-59	495	165 (33.9)	33.3
60-79	165	55 (11.3)	33.3
Subtotal	1,980	487 (100)	24.6
Women			
20-39	1,485	273 (54.8)	18.4
40-59	770	171 (34.3)	22.2
60-79	165	54 (10.8)	32.7
Subtotal	2,420	498 (100)	20.6
Total	4,400	985	22.4

^aThe number of distributed questionnaires

^bResponse rate

Table 2 Logistic regression analysis of rates of awareness about warnings on the consumption of alcoholic beverages

	N	Underage drinking ^a			Drunk driving ^b			Drinking during pregnancy ^c			Moderation in drinking ^d		
		AOR	95% CI	<i>p</i> value	AOR	95% CI	<i>p</i> value	AOR	95% CI	<i>p</i> value	AOR	95% CI	<i>p</i> value
Sex													
Men	487	1.00	reference		1.00	reference		1.00	reference		1.00	reference	
Women	498	2.18	1.06-4.47	0.033	1.03	0.73-1.44	0.876	1.55	1.19-2.03	0.001	1.14	0.89-1.47	0.298
Age													
20-39	540	1.00	reference		1.00	reference		1.00	reference		1.00	reference	
40-59	336	0.52	0.25-1.09	0.082	0.91	0.64-1.31	0.627	0.64	0.48-0.85	0.002	0.93	0.71-1.23	0.624
60-79	109	0.54	0.19-1.53	0.243	1.32	0.72-2.42	0.370	0.36	0.23-0.55	<0.001	1.12	0.74-1.70	0.587
Drinking alcohol													
No	335	1.00	reference		1.00	reference		1.00	reference		1.00	reference	
Yes	650	2.05	1.04-4.07	0.039	1.19	0.84-1.69	0.340	2.85	2.15-3.77	<0.001	1.39	1.07-1.82	0.016
Awareness rates (%)		985	96.4		83.7			59.6			45.5		

^a"Alcoholic beverages may be consumed by those aged 20 and over," and "Alcohol is for those who have turned 20 years old."

^b"Drinking and driving is prohibited by law."

^c"Drinking alcohol during pregnancy or nursing may adversely affect the development of your fetus or child."

^d"Drink in moderation."

AOR, Adjusted Odds Ratio; 95% CI, 95% Confidence Interval.

underage drinking, drunk driving, drinking during pregnancy, and drinking in moderation were 96.4%, 83.7%, 59.6%, and 45.5%, respectively. With regard to awareness of warnings against underage drinking, the odds ratio (OR) for women was significantly high. With regard to awareness of warnings against drinking during pregnancy, significant gender- and age-based differences were observed. With regard to awareness of warnings against drunk driving and about drinking in moderation, no significant gender- or age-based difference was observed.

The rate of awareness of the STOP symbol to discourage underage drinking was 62.3% in total. However, the rates for males and females in their 20s were higher than in the other age groups (79.1% [N = 105], 86.5% [N = 111], respectively).

Table 3 shows the results of a logistic regression analysis with regard to the media that carried the warnings against underage drinking. Awareness of warnings on containers of alcoholic beverages was the highest (66.1%), followed by television (58.9%), newspapers (44.7%), and posters (41.0%). Significant gender-based differences were observed with regard to awareness of warnings on containers and in newspapers. With regard to the rates of awareness of warnings on containers, television, newspapers, and posters, significant age-based differences were observed.

The results of logistic regression analysis of the media awareness of warnings against drunk driving are shown in Table 4. The rate of awareness of warnings

on television was the highest (49.3%), followed by posters (40.5%), newspapers (38.5%), and containers (35.1%). With regard to the rate of awareness of warnings on posters, a significant gender-based difference was observed. On the other hand, significant age-based differences were observed for rates of awareness about warnings on containers, newspapers, and posters.

Discussion

The results of this study revealed that the rates of awareness of warnings against underage drinking and drunk driving were high (96.4% and 83.7%, respectively), whereas those against drinking during pregnancy and for encouraging moderation in drinking were as low as under 60% and under 50%, respectively. These results suggest that the liquor industry should focus in the future on corporate social responsibility activities that include the prevention of drinking during pregnancy and encouragement of moderation in drinking, among other alcohol-related problems. This finding is of substantial significance. A review by Wilkinson *et al.* revealed that there was neither international consensus on the use of warning labels on alcoholic beverages nor consistency in the format or wording [6]. Therefore, the results of our study may offer valuable insights into the assessment of warning labels on alcoholic beverages worldwide.

Most countries legally stipulate a minimum age for consuming and purchasing alcoholic beverages, rang-

Table 3 Logistic regression analysis of the media used to convey warnings against underage drinking

	N	Containers			Television			Newspapers			Posters		
		AOR	95% CI	p value	AOR	95% CI	p value	AOR	95% CI	p value	AOR	95% CI	p value
Sex													
Men	487	1.00	reference		1.00	reference		1.00	reference		1.00	reference	
Women	498	1.63	1.24–2.14	0.001	0.90	0.70–1.17	0.436	0.77	0.60–1.00	0.047	1.18	0.91–1.53	0.202
Age													
20–39	540	1.00	reference		1.00	reference		1.00	reference		1.00	reference	
40–59	336	0.53	0.40–0.71	<0.001	0.61	0.46–0.80	<0.001	1.20	0.91–1.58	0.195	0.75	0.56–0.99	0.041
60–79	109	0.38	0.25–0.58	<0.001	0.58	0.38–0.88	0.011	2.12	1.39–3.22	<0.001	1.17	0.77–1.77	0.463
Drinking alcohol													
No	335	1.00	reference		1.00	reference		1.00	reference		1.00	reference	
Yes	650	1.78	1.34–2.36	<0.001	1.06	0.81–1.38	0.699	1.19	0.91–1.56	0.209	1.23	0.94–1.62	0.130
Awareness rates (%)		985	66.1		58.9			44.7			41.0		

AOR, Adjusted Odds Ratio; 95% CI, 95% Confidence Interval.

Table 4 Logistic regression analysis of the media used to convey warnings against drunk driving

	N	Containers			Television			Newspapers			Posters		
		AOR	95% CI	p value	AOR	95% CI	p value	AOR	95% CI	p value	AOR	95% CI	p value
Sex													
Men	487	1.00	reference		1.00	reference		1.00	reference		1.00	reference	
Women	498	1.11	0.85–1.44	0.452	0.97	0.75–1.24	0.795	0.85	0.65–1.10	0.219	1.36	1.05–1.76	0.021
Age													
20–39	540	1.00	reference		1.00	reference		1.00	reference		1.00	reference	
40–59	336	0.68	0.51–0.91	0.010	0.84	0.64–1.10	0.196	1.13	0.85–1.49	0.417	0.73	0.55–0.97	0.029
60–79	109	0.71	0.46–1.10	0.128	0.98	0.65–1.48	0.923	2.77	1.81–4.23	<0.001	1.35	0.89–2.04	0.158
Drinking alcohol													
No	335	1.00	reference		1.00	reference		1.00	reference		1.00	reference	
Yes	650	1.45	1.09–1.93	0.011	1.14	0.87–1.48	0.341	1.27	0.96–1.67	0.097	1.62	1.23–2.14	0.001
Awareness rates (%)	985		35.1			49.3			38.5			40.5	

AOR, Adjusted Odds Ratio; 95% CI, 95% Confidence Interval.

ing from 16 to 25 [1]. In Japan, alcohol consumption by those aged under 20 years is prohibited by the Act for Prohibiting Minors from Drinking [5, 10]. However, according to a large-scale national survey of junior high and high school students in Japan conducted from December 2000 to January 2001, the percentages of boys who consumed alcoholic beverages once or more per week in their first year of junior high school and in their third year of high school were 4.0% and 17.0%, respectively, and the corresponding figures for girls were 3.3% and 8.7% [11]. The present survey was conducted on members of the general population aged 20 years and above, and showed that the rate of awareness of warnings against underage drinking was extremely high (96.4%). Thus, there was a large gap between the rate of awareness among the adult subjects in this study and the actual drinking behavior of the minors. According to the results of a study in the U.S., the rates of lifetime dependence declined from more than 40% among individuals who started drinking at age 14 or younger to roughly 10% among those who started drinking at age 20 or older [12]. In addition, a review by Shults *et al.* provided evidence of a median 16% decline in motor vehicle crashes among underage youth in states that increased the minimum legal drinking age to 21 years [13]. To make warnings more effective will require not only messages on the prohibition of underage drinking, but also the broadcasting of concrete messages to the public on the harmful effects of underage drinking or the positive effects of the prohi-

bition of underage drinking, such as the abovementioned findings in the U.S. With regard to the media carrying such warnings, the ORs for containers and television, for which the rates of awareness were higher, were significantly low for participants in their 40s/50s and 60s/70s. The ORs for containers for participants in their 40s/50s and 60s/70s were 0.53 (95% Confidence Interval [95% CI]; 0.40–0.71) and 0.38 (95% CI; 0.25–0.58), respectively, and those for television were 0.61 (95% CI; 0.46–0.80) and 0.58 (95% CI; 0.38–0.88), respectively. This indicated that awareness decreased with increasing age. Conversely, with regard to awareness of warnings in newspapers, the OR for participants in their 60s/70s was significantly high (2.12 [95% CI; 1.39–3.22]). As the middle-aged and elderly are the parents or grandparents of minors who are beginning to take an interest in drinking, the selection of effective media for this generation, who can discipline and guide minors, must be considered carefully in order to effectively convey messages discouraging underage drinking. With regard to the higher rate of awareness of warnings on containers, in addition to stipulations by the Self-Regulatory Code, those contained in the announcement of the National Tax Administration Agency may have strongly affected the awareness rate. This announcement required that, from July 1997, messages such as “Underage drinking is prohibited by applicable laws” and “Alcoholic beverages may be consumed by those aged 20 and over” had to appear on containers [10].

Strong penalties introduced by the amendment of the Road Traffic Act in June 2002 in Japan were associated with substantial reductions in the number of fatal accidents caused by drunk driving [5, 14], which, in 2008, was less than one-fourth of the number 10 years previously [15]. The rate of awareness of the warnings against drunk driving in this study was 83.7%, which was the second highest after that for underage drinking. However, the result of logistic regression analysis with regard to awareness of warnings against drunk driving and that with regard to television, for which the rate of awareness of such indications was highest, revealed no significant differences with regard to gender, age, or habitual alcohol consumption. This may signify that the prohibition of drunk driving has been equally recognized by a wide range of people. Therefore, this high awareness can be attributed to the impact of the stronger penalties themselves, rather than the effects of the warnings. Nevertheless, Greenfield *et al.* reported that individuals who had seen such labels in the U.S. were more likely to engage in conversations about drinking and driving than those who had not [8]. Warnings against drunk driving may deter drunk driving in Japan because they repeatedly remind people of the severe punishments. Among the recognized media, the rate of awareness about warnings against drunk driving on containers was lower (35.1%) than that for underage drinking. In order to clearly disseminate the idea that drunk driving is not permissible because it sometimes causes fatal and catastrophic accidents, the government must require the vendors of alcoholic beverages to indicate warnings regarding drunk driving on containers.

One reason for the low (60%) rate of awareness about warnings against drinking during pregnancy may be their relatively recent (2004) introduction [4, 5]. The results of the Infant Physical Growth Survey conducted by the Ministry of Health, Labour and Welfare in September 2000 indicated that the prevalence of drinking among pregnant women was 18.1%, and that it increased with age [5, 16]. In addition, the result of a nationwide survey in June 2003 on the drinking behavior of adults indicated that the percentage of female drinkers had increased in recent years [5, 17]. From these previous findings, the necessity of advocating abstinence from drinking during pregnancy appears to be high. As the rate of awareness

about the STOP symbol discouraging underage drinking was high among both men and women in their 20s, even though this initiative was introduced recently (2005) [4], various methods such as this symbol may be needed to discourage drinking during pregnancy. The results of logistic regression analysis on the rates of awareness about warnings against drinking during pregnancy revealed that such awareness decreased with increased age; the ORs for participants in their 40s/50s and 60s/70s were 0.64 (95% CI; 0.48–0.85) and 0.36 (95% CI; 0.23–0.55), respectively. A more aggressive approach to catch the attention of the middle-aged and elderly, who represent the parents of pregnant women, may be required. A study in the U.S. indicated that 6 months after the warning label law had been implemented, lighter drinkers decreased their drinking during pregnancy by a small but statistically significant amount. In contrast, pregnant risk drinkers did not significantly change their alcohol consumption [9]. However, unlike other messages, warnings against drinking during pregnancy refer to concrete harmful effects such as damage to the fetus or infant. To increase the awareness rate of such messages, these messages should convey these dangers.

The rate of awareness about messages to encourage moderation in drinking was the lowest (45.5%). This may be because messages regarding moderation tend to lack details or specifics, and this ambiguity makes them difficult to understand. Furthermore, the wording used in such messages (variations of “Be careful not to drink to excess” and “Drink pleasantly and in moderation”) varies among different alcoholic beverage vendors, and this may reduce the awareness rate. Therefore, the introduction of standardized wording would be desirable. In addition, care must be taken when developing messages on drinking in moderation so that they will not be mistakenly interpreted as encouragement to drink. Warnings such as “Drinking too much alcohol may cause dependency and make you unable to avoid drinking against your will” are also required. According to a WHO report, exposure to health warnings on alcoholic product containers did not produce a change in drinking behavior *per se*, in contrast to evidence of the impact of warning messages on tobacco products. This report also indicated that more graphic and larger warnings for cigarettes had effected changes in smoking patterns [18]. In Britain, it has been mandatory since 2008 for alcohol product

labels to give details on alcohol unit contents coupled with safe daily limits for consumption in men and women [19]. With regard to the abovementioned Self-Regulatory Code in Japan, Higuchi *et al.* mentioned that although the contents of the standards included restrictions on the language used in advertising and publicity and on broadcasting times, it was evident that those regulations did not have an actual effect on the prevention of alcohol-related harm [5]. A petition in Japan for tightening regulations on TV commercials for alcoholic beverages was submitted in July 2009 to the National Tax Administration Agency, Ministry of Health, Labour and Welfare, and the Cabinet Office. This petition was signed by the Japan Housewives' Association, the Japan Council on Alcohol Problems, the Japanese Society of Alcohol-Related Problems, and the Japanese Society of Psychiatric Research on Alcohol <<http://www.ask.or.jp/ask090730-2.html> accessed on Mar. 2, 2010, in Japanese>. The petition presented the worry some situation of the Japanese public, who were exposed daily to internationally unacceptable TV commercials for alcoholic beverages. We refer to this petition in order to depict today's alarming situation of advertising alcoholic beverages in Japan.

The limitations of this study and the issues to be addressed in the future are as follows. First, the response rate was low (22.4%), and thus a limitation. As it is possible that people who were interested in alcohol-related problems were more likely than others to respond to this survey, the awareness rates obtained may have been overestimated. The response rate for males was higher than that for females, and that of participants in their 40s/50s and 60s/70s was higher than for participants in their 20s/30s. If more people who had an interest in alcohol-related problems had responded in the groups showing low response rates, the high OR for women and the low OR for the middle-aged and elderly might have represented overestimates. To increase the response rate, the survey method should be improved. A study on alcohol consumption overseas reported that a high response rate (82%) could be achieved in an Internet survey by repeatedly asking for participation in the survey at intervals, followed by requests made by telephone [20]. Second, the definition of habitual alcohol consumption was ambiguous because question on the frequency and amount of alcohol consumption were not

included. A nationwide survey on the general adult population in Japan reported that the percentages of subjects who drank at least one day per week (every week) were 64.4% for males and 27.5% for females [5, 17]. In our study, 62.0% of females stated that they usually consumed alcohol; thus the female participants may not have represented the general female population. However, as the definition of alcohol consumption was ambiguous, this point cannot be verified using the current data. Third, being aware of warnings and complying with them are different issues, and thus it is more important to know how warnings have influenced the drinking behavior of the general public. Therefore, with regard to the second and third limitations, a longitudinal study must be conducted on how awareness of warnings influences actual behavior, with accurate data on the frequency and amount of alcohol consumed participants.

In this study, we conducted an Internet-based questionnaire survey and examined the awareness of warnings about the consumption of alcoholic beverages and the media that convey such messages. As the rates of awareness of warnings regarding drinking during pregnancy and moderation in drinking were low, these issues should be addressed in the future. The results also suggested that reviewing and devising effective warnings were necessary. As gender- and age-based differences were observed with regard to the rate of awareness about warnings and the media used for conveying them, more effective means of broadcasting these messages must be devised by considering gender and age, and must be employed on a regular basis. This may help the general public to make responsible decisions about drinking, thus minimizing the likelihood of accidents caused by it [1].

The data used in this study were obtained from an Internet survey conducted by NTT Resonant Inc., which was entrusted with the task of conducting the survey by the Japan Health and Alcohol Incorporated Association. The survey was conducted as part of the "Comprehensive Study on Actual Alcohol Consumption Status, Various Lifestyle-related and Public-Health-related Problems Relating with Alcohol Consumption, and Their Countermeasures in Japan" (chief researcher: Hiromasa Ishii, School of Medicine, Keio University) and subsidized by the scientific research fund of the Ministry of Health, Labour and Welfare. Data analyses were conducted at

the Department of Public Health, School of Medicine, Showa University.

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