

TYPE OF ALCOHOLIC BEVERAGE AND HIGH-RISK DRINKING: HOW RISKY IS BEER DRINKING IN KOREA?

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Abstract — **Aims:** To examine the association of beverage type with high-risk drinking in Korea. **Methods:** Data were analysed from the Korea's 1997 behavioural risk factor surveillance system survey collected by a stratified random sampling method ($n = 1045$). After alcohol consumption per drinking day was categorized into three risk levels for short-term or 'acute' harm on the basis of the World Health Organization's guidelines, logistic regression analysis adjusting for socio-demographic factors was performed for each beverage type. **Results:** Using beer drinkers as the reference, those who drank soju (the most widely consumed traditional beverage in Korea) showed an adjusted odds ratio (OR) of 3.62 [95% confidence interval (CI) = 2.28–5.76] for high and very high risk from drinking and those who drank spirits had adjusted OR of 10.65 (95%CI = 4.32–26.27). **Conclusions:** In Korea, unlike in many western countries, beer is not the highest risk beverage. The relatively high price of beer in Korea is likely to be one influence. It is concluded that country-specific differences are important in studies on associations between alcoholic beverage types and high risk drinking.

INTRODUCTION

Several studies have suggested that beer is more likely to be associated with high-risk behaviours, such as heavy and excessive drinking and other alcohol-related problems, than are other types of beverage (Lemmens *et al.*, 1992; Jensen *et al.*, 2002). Also, researchers have found that those who preferred beer, compared with those who typically preferred spirits or wine, drank to excessive levels and were more likely to drive after drinking (Berger and Snortum, 1985). However, these findings were obtained from studies in western developed countries. Whether beer is a relatively high-risk beverage in non-western countries is not certain. Using data available in Korea and the World Health Organization's (WHO) guidelines on high-risk drinking for acute harm, the present study addresses whether beer is a relatively high-risk beverage in Korea.

SUBJECTS AND METHODS

We analysed data from Korea's behavioural risk factor surveillance system survey conducted during April and May 1997 by the Ministry of Health and Social Welfare, Republic of Korea, in cooperation with the College of Medicine, Seoul National University. The survey used a stratified random sampling design. The Korean samples were divided into 28 strata based on 120 common socio-demographic characteristics obtained from the National Population and Household Census. Then, households from each stratum were chosen by a proportional allocation method, and interviewed by telephone. Collection of data and procedures were designed in accordance with the methodology recommended for behavioural risk factor surveillance system surveys (Remington *et al.*, 1988). In total, 1826 Koreans aged 15 years or older were interviewed over the telephone, and 1060 cases

were completed (response rate: 58.1%). Among the 1060 cases, 1045 cases provided full information for our analysis. Together with their socio-demographic characteristics, respondents were asked what types of beverage they had consumed in the month preceding the survey. Questions were also asked concerning the frequency of drinking in the preceding month for each consumed beverage and the amount usually consumed when they drank the beverage.

Before including type of beverage in our analyses, we took into consideration two country-specific characteristics related to drinking in Korea. First, two types of alcoholic beverages are traditionally popular in Korea: soju and makkolli. Soju, the most widely used traditional beverage, is a distilled liquor made from fermented potatoes and its alcohol content, 25%, is between that of wine (10–14%) and spirits (more than 35%). Makkolli is the oldest liquor in Korea, made by fermenting non-glutinous and glutinous rice together. The constituents of soju are not similar to those of wine and spirits. Wine is not common in Korea; in terms of alcohol content, wine is more close to makkolli (about 7%) than to beer or soju. On the basis of this information, we first classified a beverage into one of five types (beer, soju, spirits, makkolli, wine). In contrast, for multivariate analyses, we tied makkolli and wine into one category, 'makkolli or wine.' At the time of the survey, beer strength varied between products, but was beginning to be standardized at 4% following guidelines from the Korea Alcohol and Liquor Industry Association and Korea's National Tax Service.

Second, the survey revealed that some respondents drank two or more types of beverage in the last month. Some Korean drinkers consume more than one type of beverage in a day. If we include two or more types of beverage for those respondents, findings in a logistic regression analysis will not be independent. To avoid this problem, we selected only one type of beverage from among two or more alcoholic beverages that they drank, in the following way. We first categorized respondents into two groups, drinkers (someone who consumed at least one drink in the past month) and non-drinkers. For each drinker ($n = 530$), beverage-specific quantity-frequency scores were computed by multiplying the frequency of drinking of each beverage by the usual amount

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consumed (Kilty, 1990; Smart and Walsh, 1995). After assigning alcohol contents of beverage types [beer 4% (by volume), soju 25%, spirits 40%, makkolli 7% and wine 12%] to the computed quantity-frequency score and assuming that 1 ml consumed alcohol includes 0.79 g of pure alcohol (World Health Organization, 2000), we calculated pure alcohol content which each drinker had consumed in a session through each type of beverage. Finally, we selected the single beverage of which each drinker had consumed the most pure alcohol in the last month, and then finally included that type of beverage in our analyses.

Various socio-demographic characteristics previously shown to be related to individual alcohol intake and consumption were assessed as confounding factors. Age was divided by the mean age, 46.37 years. Respondents were classified into male and female. They were grouped according to whether they lived with a partner or not. Respondents reported their level of education, and we categorized them on whether they completed their high school education. They were also grouped according to their employment status. Considering their residential areas, we divided them according to whether they lived in large cities or not. With regard to smoking, respondents were grouped according to whether they had ever smoked in the last month. Body mass index (BMI) was categorized on the basis of whether the index was greater than or equal to 25. Concerning stress level and subjective health status, respondents were grouped according to whether a respondent had felt 'often stressed' ('Have you ever felt stressed to a degree to which you could not bear it?') in the last month or not and whether a respondent evaluated his or her health status as worse or not compared to others.

On the basis of information on the usual consumption of pure alcohol for each chosen beverage, three levels of risk from drinking were categorized according to the guidelines from the World Health Organization (2000) on high risk drinking for short-term or 'acute' harm, in particular, alcohol-related acute diseases such as acute gastritis and pancreatitis, road crashes, violent incidents, suicide, and other causes of injury. These levels of risk from drinking are: (1) low or medium risk drinking (women who drank less than or equal to

40 g pure alcohol per drinking day and men who drank less than or equal to 60 g per drinking day); (2) high-risk drinking (women who drank more than 40 g and less than or equal to 60 g per drinking day and men who drank more than 60 g and less than or equal to 100 g per drinking day; and (3) very high-risk drinking (women who drank more than 60 g per drinking day and men who drank more than 100 g per drinking day).

Our analyses were two-fold. First, the significance of the associations between different levels of risk from drinking and selected variables were tested through chi-squared tests. Second, we used multivariate logistic regression controlling for various confounding factors to detect OR for risky drinking (with 95%CI limits). The data were weighted to account for non-response, census projection counts, and age and sex of the population. All statistical analyses were conducted by using SAS 8 software package.

RESULTS

Beer and soju were most commonly a drinker's main beverage (Table 1). (Wine was the main beverage for only one drinker.) Spirits (72.4%) and soju (53.0%) were more likely to be associated with high and very high risk from drinking than were makkolli (32.3%) and beer (23.6%) (Table 1). In addition, soju emerged as the beverage for which more than half Korean drinkers had consumed the highest level of pure alcohol in the last month (290 among 530 cases, 54.7%), followed by beer with the second greatest number of drinkers (33.6%). The remaining types showed relatively low proportions of risky drinkers: makkolli 5.9%, spirits 5.5% and wine 0.3%. As can be seen, males, those who were employed, those who felt stressed often, or current smokers, were involved in high or very high risk from drinking.

Table 2 shows the results of logistic regressions, predicting associations of four beverage types with three levels of risk from drinking. We first obtained crude estimates of OR only with the beverage types. Then, considering the potential influence of certain characteristics on the choices of a beverage type, we included the socio-demographic characteristics

Table 1. Comparisons of different levels of risk from drinking on selected characteristics

Parameter	Low or medium risk % (n) (n = 302)	High risk % (n) (n = 126)	Very high risk % (n) (n = 102)	P-value (chi-squared)
Type of beverage				
Beer	76.4 (136)	12.9 (23)	10.7 (19)	0.0000
Soju	47.0 (136)	31.0 (90)	22.0 (64)	
Spirits	27.6 (8)	10.3 (3)	62.1 (18)	
Makkolli	67.7 (21)	29.0 (9)	3.3 (1)	
Wine	50.0 (1)	50.0 (1)	0.0 (0)	
Male	43.7	84.1	69.6	0.0000
Age (\geq mean)	38.7	42.9	36.3	0.5772
Living alone	25.5	29.4	35.3	0.1573
Completed high school education	71.2	69.1	71.6	0.8878
Employed	62.9	78.6	71.6	0.0048
Living in a large city	53.3	45.2	60.8	0.0629
Current smoker	29.5	63.5	57.8	0.0000
Body mass index (\geq 25)	17.6	14.3	25.5	0.1882
Often stressful	13.9	16.7	27.5	0.0072
Worse health	22.2	18.3	23.5	0.5714

Table 2. Odds ratios and 95% confidence intervals for different levels of risk from drinking (logistic regression)^a

Type of beverage	High and very high risk		Very high risk	
	Crude	Adjusted ^b	Crude	Adjusted
Beer	1.00	1.00	1.00	1.00
Soju	3.13 (2.11–4.65)	3.62 (2.28–5.76)	2.68 (1.57–4.57)	3.40 (1.86–6.19)
Spirits	9.67 (4.18–22.38)	10.65 (4.32–26.27)	11.85 (5.43–25.89)	11.55 (5.07–26.30)
Makkolli or wine	1.43 (0.62–3.32)	1.65 (0.63–4.35)	0.22 (0.02–2.48)	0.24 (0.02–2.82)

Values are odds ratios (with 95% confidence intervals).

^aEach group was compared to those who did not fit in the definition for each risk group ($n = 530$). ^bEstimates are adjusted simultaneously for sex, age, marital status, education, employment, residential area, current smoking, body mass index, stress, subjective health and number of beverages consumed in the last month.

described above as confounding factors and obtained adjusted OR and significance levels. Defining high and very high risk from drinking as risky drinking, those who drank spirits or soju had significantly increased risk from drinking, compared to those who drank beer. Using those who drank beer as the reference group, those who drank spirits had the highest crude OR of 9.67 (95%CI = 4.18–22.38) and adjusted OR of 10.65 (95%CI = 4.32–26.27) for risky drinking. For those who drank soju, crude and adjusted OR were 3.13 (95%CI = 2.11–4.65) and 3.62 (95%CI = 2.28–5.76) respectively. Makkolli or wine drinkers were not significantly different from beer drinkers. When we regarded only very high risk from drinking as risky drinking, those who drank spirits or soju were significantly more involved in risky drinking than those who drank beer.

DISCUSSION

Main conclusions

The present study has shown that, in Korea, beer is not the highest risk alcoholic beverage for alcohol-related harm, unlike the situation in many Western countries. Soju, the most widely consumed alcoholic beverage in Korea, by contrast, and perhaps not surprisingly, is associated with the greatest risk. Our data therefore illustrate the need to study country-specific differences in beverage types in relation to high-risk drinking.

Study limitations

In the data we employed for this study, respondents were asked questions about beverage types that they consumed in the last month and their usual consumption of these types per drinking day (Kilty, 1990; Smart and Walsh, 1995; Theobald *et al.*, 2000). Unfortunately, these type of data often disregard a potential measurement error incurred by the possibility of two or more types of beverage being consumed in a drinking day. For improved analyses, either the 'last 7 days' or the 'graduated quantity-frequency' approaches are recommended (Lemmens *et al.*, 1992; Rehm *et al.*, 1999).

This study used cross-sectional data, not longitudinal data, so our results may suffer from the inadequacy of causal inference and recall bias (Jensen *et al.*, 2002). In addition, in order to investigate confounders more precisely, we need more information than we had available about the social group to which respondents belonged (Ennett *et al.*, 1999; Engels and ter Bogt, 2001). In Asian countries such as China, Japan and

Korea, the role and influence of social group on drinking behaviour may be stronger than in Western countries (Hwang and Akers, 2002).

Role of price

Price may have been a factor limiting high sessional beer drinking at the time of the study. The Korea's National Tax Service levies tax on alcoholic beverages. In 1997, the *ad valorem* tax rates were 130% for beer, 35% for soju, 100% for spirits, 5% for makkolli and 30% for wine. Tax rate per gram of pure ethanol (%/gram) was thus 41.14% for beer, 1.77% for soju, 3.16% for spirits, 0.90% for makkolli and 3.16% for wine. In 2001, new tax rates were introduced: 100% for beer and 72% for soju and spirits, lowering the tax rate per gram of pure ethanol (%/g) to 31.65% for beer and raising that for soju to 3.65%. Thus, there is still apparent protection of widely consumed traditional alcoholic beverages. It will be important to measure whether this slight price change will alter relations between risky drinking and beverage type.

Implications

In order for a country to reduce the economic and social cost associated with alcohol consumption, government policy needs to be targeted at the specific type of beverage for which the highest costs are incurred, and toward the specific population group that usually consumes this particular beverage. In some western countries, beer has been regarded as the beverage most likely to lead to a variety of alcohol problems. However, currently in Korea, it is soju, rather than beer, that has the higher association with risk from drinking for acute harm. Soju is also the most widely consumed beverage across all levels of population. In this regard, in Korea, soju, rather than beer, ought to be targeted. Therefore, we think this study has policy implications for Korea, and perhaps for other countries as well.

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