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Estimation of High-Risk Drinkers and Drinking Behavior in Korea - Focusing on Korean National Health and Nutrition Examination Survey (KNHANES) and Korean Statistical Information Service Data -

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ABSTRACT

Objectives: This study investigated the average number of drinkers in Korea, the number of high-risk drinkers, the average amount of alcohol consumed by high-risk drinkers, and the types of alcohol consumed according to the characteristics of the group of dependent drinkers.

Methods: The results were obtained by analyzing the following data: The Global Status Report on Alcohol and Health; Country Profile 2014; WHO Country Profile 2014; Korea National Health and Nutrition Examination Survey 2014, Korean Statistical Information Service; National Tax Statistics-Liquor Tax; Gallup Drinking Frequency Survey 2015

Results: This study found that a large proportion of drinkers in Korea are already high-risk drinkers, and even among drinkers, alcohol consumption was highly biased. It was reported that 49.8% of men in the problem, abuse, and dependence groups accounted for 92.4% of total alcohol consumption among the male population. Notably, the 9.6% of men making up the dependent group consumed more than 30% of the alcohol ingested among males. Women had significant variations within groups that were considered high-risk and exhibited a large share of alcohol consumption in the problem (10.0% of the female population), abuse (1.8% of the female population), and dependence (1.5% of the female population) groups, constituting 72.8% of total alcohol consumption. The average amount of alcohol consumed by drinkers in Korea seems to have exceeded the level of intake by high-risk groups. Alcohol-dependent groups consumed 900.7 mL of soju, 405.2 mL of table wine, and 2,043.8 mL of beer, which is very similar to the consumption average of 2,031 mL of beer and 895.2 mL of soju in the drinking group.

Conclusion: It has been shown that men's dependence on alcohol is serious, and it is possible to infer that alcohol consumption in some vulnerable groups is very high. As the average alcohol intake among alcohol-dependent groups and ordinary drinkers is very similar, it is highly likely that the drinker is an alcohol-dependent consumer in Korea.

Keywords: Alcohol consumption, high-risk drinker, alcohol-dependent people

I. Introduction

The level of alcohol consumption in Korea totaled 3.8 million kL[1] in 2012, which translates to about 59.8 liters of alcohol per capita, including children. As of 2005, the country ranked 13th among 186 member countries of the World Health Organization (WHO) and ranked first in terms of high alcohol consumption of distilled liquor.[2,3]

Therefore, there were countless health problems and instances of social harm caused by alcohol consumption. In 2012, 21.8% of adult male drinkers

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and 6.0% of adult female drinkers were classified as high-risk drinkers.[4,5] In 2004, the prevalence rate of disability caused by alcohol consumption among men was 13.1%, and was ranked fifth among 218 countries surveyed.[6] In particular, 70.5% of cases of liver cirrhosis were caused by alcohol,[7] and 9.2% of deaths of Koreans and 9.4% of the burden of disease were caused by alcohol consumption in 2010.[8,9] In particular, for men, 16% of deaths and disease burdens are found to be alcohol-related. This result is much higher compared with the global survey of 5.2% of deaths and 3.9% of disease burdens associated with alcohol.[10,11] However, as mentioned above, this is the average national alcohol intake, including among those who have not consumed any actual alcohol, such as children and lifetime nondrinkers.[12,13] In the case of more than 60 grams of alcohol consumed in the neighborhood (at 25% alcohol level, 240 grams per week, 360 mL per bottle of soju), the average alcohol intake level of the drinker is underestimated, even though it is actually more ingested. That is why counterplans have been prepared inadequately.

In addition, a large number of data were inevitably generated by survey responses, and relatively large errors occurred according to the psychological and environmental conditions of respondents. There is an urgent need for actual data from the drinking-risk group in Korea.

This study reports on the average alcohol intake of normal/moderate alcohol drinkers, the number of high-risk drinkers and their average alcohol intake, and the types of alcohol consumed by alcohol-dependant group, based on various statistics on alcohol consumption among Koreans.

II. Methods

The following data were used to investigate the drinking behavior of Koreans.

- Average alcohol consumption by gender/age in Korea[15]
- High-risk drinkers and drinker's ratio data in Korea[16]
- Average daily intake per person by type of liquor[17]
- Total consumption ratio data by alcohol problem group[17]
- Population Distribution Data by Gender and Age[18]
- The consumption % of liquor type according to the level of alcohol consumption[19]
- Forwarding volume data by alcohol type in 2014[20]
- Annual binge drinking frequency for drinkers[21]
- Gallup Korea Daily Opinion[22]

AUDIT (Alcohol Use Disorder Identification Test) questionnaire was used as a criterion for the alcohol problem group.[23]

There were limitations in using these data. The age subjects surveyed in these data varies from '15 years and older' or '19 years and older', depending on the data. Also, the alcohol concentration of alcoholic beverages actually consumed in Korea may be slightly different from the standard alcohol concentration of alcohol used by the National Tax Service of Korea.

III. Results

1. Drinking Status in Korea

According to the Korea National Health Statistics released by the Ministry of Health and Welfare in 2016, 75.3% of men and 48.9% of women drink more than once a month.[24] For men, this is not a significant difference compared to 72.6% for 2005. Drinking among women has steadily increased from 37% in 2005 to 48.9% in 2016 by more than 10%. This shows that the female drinking population has increased compared with the past.

According to the survey conducted by the 5th Korea National Health & Nutrition Examination Survey,[17] the average amount of alcohol consumed according to gender/age in the Republic of Korea

Table 1. Average alcohol consumption by gender/age in Korea based on KNHANES

Classification			Alcohol per capita (19+) consumption (in grams of pure alcohol) Total/Drinker		
			N	Mean (g)	SD
Total			**3,601/2,008**	**12.4/20.0**	**0.58/0.85**
Gender	Male	19~24	96/77	26.5/31.1	5.13/5.8
		25~44	561/439	17.8/23.2	0.96/1.22
		45~64	700/492	21.9/29.6	1.43/1.83
		Total	**1,357/1,008**	**20.5/26.7**	**1.00/1.24**
	Female	19~24	170/109	8.6/12.8	2.20/3.02
		25~44	989/506	4.9/9.2	0.46/0.82
		45~64	1085/385	2.5/6.7	0.33/0.82
		Total	**2,244/1,000**	**4.3/9.0**	**0.37/0.72**

Source: KNHANES V (2014)

is 26.7 g by males and 9.0 g by females, as shown in Table 1. Men were found to drink the most at the age of 19-24 and to have more alcohol consumption at 45 to 64 than at the age of 25-44. Women consumed the most alcohol at the age of 19-24, but their alcohol consumption decreased with age. On average, people in Korea seem to be drinking moderately.

The average alcohol consumption levels are equivalent to 106.8 mL for men and 36 mL for women when converted into soju volume (25% of the standard alcohol level). For example, this means that men consume less than one-third of a bottle of soju and women drink less than a small glass of soju (50 mL). The fact that a single drinking man drinks only two glasses of soju is a departure from reality. Also, the average alcohol intake among drunk men is almost three times that of drunk women. Somewhat higher levels of alcohol consumption were recorded among both younger men and women aged 19 to 24. Moreover, average alcohol consumption among women decreased by two-thirds to one-half as age increased, while average alcohol intake among men did not decrease significantly.

This study investigated the amount of liquor produced in Korea or imported from abroad. In 2017, 3,551,000 kL of liquor were produced in Korea and 423,000 kL of liquor were imported. The total volume of liquors (domestically produced plus imported) was similar to that of 2013, but the volume of imports showed a slight increase.[1)]

According to the OECD 2017 Health at a Glance,[12)] the number of alcohol consumption per person over 20 years of age was 9.14 liters in 2015, a gradual decline from 12.5 liters in 1987 over the past two decades. The most widely-consumed alcohol type was diluted soju (standard alcohol concentration 25%), with 5.6 L consumption. Diluted soju was followed by 2.3 liters of beer and 0.8 liters of makgeolli (standard alcohol concentration 7%).

2. Problems of Drinking Survey

According to a survey conducted by Gallup Korea in 2015 on drinking frequency[22)] (Table 2), 48% of the respondents said they do not drink alcohol, this is slightly down from 1994 and 2002. According to the 2015 survey, the percentage of people who answered that they drank almost every day decreased slightly compared to 1994 and 2002. However, the number of people who answered that they drink once or twice a week and those who reported drinking once or twice a month were increasing, showing a decrease in the frequency of drinking.

The Korea National Health & Nutrition Examina-

Table 2. Drinking frequency survey by Gallup 2015 (%)

Year		Not drink	1-2/month	1-2/wk	3-5/wk	Every day
1994		57	11	17	10	6
2002		50	14	19	12	6
2013		48	22	19	7	3
2015	Total	48	17	22	11	2
	Male	30	18	32	16	4
	Female	65	17	13	5	0

Table 3. Annual Binge drinking frequency of drinkers

	Never	Under 1/month	1/month	1/wk	Every day
Total (%)	32.6	20.4	17.9	22.3	6.9
Male (%)	20.8	17.9	20.0	30.5	10.7
Female (%)	46.8	23.3	15.3	12.2	2.4

Source: http://stat.kpha.or.kr/

tion Survey 2014[17] calculates high-risk drinking and binge drinking indicators. The average drinking rate is 7 cups (the volume of the cup is not specified) for men and 5 cups for women. High-risk drinking is defined as drinking more than twice a week. Binge drinking is defined as drinking more than 7 cups for men and 5 cups for women in a single setting.

According to the annual binge drinking frequency data 2014 of drinkers surveyed by the Korea Health Association's drinking statistics system,[21] some 6.9% of respondents reported binge drinking almost daily. As shown in Table 3, this group was represented by 10.7% of men and 2.4% of women. Among male respondents, 30.50% said they drink heavily once a week, while 46.80% of the female respondents said they do not drink heavily. However, women drink excessively once a week (12.2%) and once a month (15.3%).

However, these data are even lower than the above Gallup's drinking frequency data (Table 2). There is reportedly an error in which the frequency of binge drinking is higher than that of drinking. This is an example of the fact that although the survey year is different, the statistics on drinking, particularly the survey responses, are error-prone.

On the other hand, it is speculated that survey respondents did not recognize the actual amount of the consumed alcohol. For example, it is possible that the men did not recognize the drinking level of seven cups and that the women did not recognize their respective drinking level of five cups. Rather, the subjects may have recognized their consumption volume as "a heavy drink" and that their reported frequency of drinking was low due to their own subjective differences.

As shown in Table 4, data from the Korea National Health & Nutrition Examination Survey 2014[17] shows the intake frequency of soju, beer, and makgeolli as the main consumption items. Except for cases where people said they rarely drink, 15.26% said they drink soju two to four times a week (104 to 208 times a year), it is notable that at least 1% of the population consumes soju every day. Except for cases where people said they rarely drink, 14.34% said they drink beer two to three times a month (24 times a year). Makgeolli represented a very high percentage of people (77.01%) who said they rarely drink, 12.21% consumed makgeolli once a month, the report showed. The data in Korea shows that soju tends to be consumed more often than beer.

Table 4. Calculation of the consumption of soju, beer, and makgeolli based on the frequency data of KNHANES

Frequency (time)	Soju intake frequency Population ratio (%)	Beer intake frequency Population ratio (%)	Makgeolli intake frq. Population ratio (%)
3/day (1,095/yr)	0.08	-	0.01
2/day (730/yr)	0.07	-	0.01
1/day (365/yr)	0.98	0.33	0.41
5-6/wk (260/yr)	2.43	1.26	0.31
2-4/wk (104/yr)	15.26	11.97	2.11
1/wk (52/yr)	10.42	12.05	3.15
2-3/month (24/yr)	12.40	14.34	4.77
1/month (12/yr)	11.32	13.59	12.21
Do not drink	47.04	46.45	77.01
Total frequency (time)[1)]	1,907,152,013	1,336,681,262	461,351,731
Amount/time (mL)[2)]	502.1	1538.0	934.0

[1)]Total frequency (time)=the corresponding population×intake frequency/yr * the corresponding population=intake frequency population ratio×population
[2)]Amount/time=forwarding quantity÷total frequency

In addition, using the above national health data, which shows the frequency of consumption in a relatively detailed manner, we can understand the consumption amount of major liquors consumed by consumers. Based on the intake frequency, the total number of people who consumed alcohol by type was calculated. Table 4 shows that soju was consumed 1,907,152,013 times, beer 1,336,681,262 times, and makgeolli 461,351,731 times per year. Based on the annual forwarding volume of liquors (Liquor forwarding volume, 2012), it is concluded that 502.1 mL of soju, 1538 mL of beer, and 934.0 mL of makgeolli are consumed in a single drinking session. If these amounts are converted into pure alcohol, drinkers will have consumed 125.5 grams of pure alcohol as soju, 61.5 grams as beer, and 65.4 grams as makgeolli in a single session. The average one-time consumption was already well over the high-risk standards.

3. Estimation of High-Risk Drinkers

The health impact and social problems caused by drinking are related to the frequency and amount of drinking, rather than whether or not the public is drinking. The World Health Organization (WHO) defines a high-risk level of pure alcohol consumption as excess of 60 g for men and 40 g for women per day based on the amount of alcohol consumed.[16)] The average drinking rate is 7 cups for men and 5 cups for women, and the frequency of drinking more than twice a week is set as high-risk drinking. Drinking more than 7 cups for men and 5 cups for women in a single session is defined as binge drinking. To what extent is alcohol intake at risk levels among Koreans, knowing the level will help us to determine the size of the vulnerable group and the degree of risk exposure.

3.1. Estimation of high-risk drinkers based on WHO data

As shown in Table 5, 12.1% of males and 0.1% of females aged 15 and older in Korea were reported to WHO 2014[16)] as high-risk drinkers. As previously mentioned, the standard consumption amount for high-risk drinkers is 240 mL when converted into 25% distilled liquor. Therefore, the level of drinking is classified as high-risk drinking when alcohol is consumed twice a week and more than 2/3 bottle of soju (240 mL) at once. However, under the redundant belief in Korea, it may be difficult

Table 5. Prevalence of high-risk drinkers & abstainers based on WHO Country Profile

		15+Males	15+Females	Total
High-risk drinkers (%)		12.1	0.1	6.0
Abstainers	Lifetime abstainers	20.9	45.7	33.5
	Former drinkers	23.2	20.3	21.7
	Abstainers, past 12 months	44.2	66.0	55.2
High-risk drinkers, drinkers only (%)		21.6	0.3	13.4

Source: WHO Country Profile 2014

to obtain consent from most of the people that this is a high-risk level intake because drinking this much is common around. Nevertheless, WHO statistics show that only 12.1% of men drink at this dangerous level.

At the same time, the percentage of non-drinkers who never drink at all is also accounted for a large portion. For men aged 15 or older, 20.9% abstained from drinking their whole lives. This figure was 45.7% for women of the same age group. Among drinkers, 23.2% of men and 20.3% of women have abstained from drinking for the past 12 months. Thus, a total of 12 months of abstinence amounts to 44.2% of males and 66.0% of females aged 15 and older. This means a large percentage of people have not been drinking for more than a year. This shows that the number of people who actually drink alcohol is 34% of female, 56% of male. And these indicate that it is impossible to identify the status of high risk groups with the average amount of alcohol consumed.

Calculating this figure as the percentage of high-risk drinkers among lifetime drinkers and those who do not drink for more than 12 months, as shown in Table 5, increases the number of high-risk drinkers to 21.6% for men and 0.3% for women. In other words, the average rate of drinkers who drink more than 240 mL (60 g of alcohol) of distilled liquor twice a week is 13.4% (21.6% of male, 0.3% of female).

If high-risk groups consume more than 60 grams of alcohol twice a week, they seem to consume more than 6.24 liters of alcohol a year, which is far lower than the WHO's annual average alcohol consumption amount of 37.6 liters for men and 11.5 liters for women. That is, the average alcohol consumption of drinkers is about six times higher than that of high-risk drinkers. Another study by the National Tax Service shows that the annual average alcohol intake is 9.14 liters. This exceeds the intake level of high-risk drinkers, even though this is the average annual alcohol intake for the general public, including those who do not drink. This data indicates that a large percentage of drinkers are already high-risk drinkers and also that alcohol consumption is highly concentrated even among drinkers in Korea.

For this reason, in assessing the dangerousness related to alcohol consumption, the assessment of the average intake of alcohol has limitations. This includes providing accurate information on the evaluation of alcohol consumption problems of the people, their health effects, and the data to determine appropriate policies.

3.2. Estimation of high-risk drinkers based on KNHANES data

Table 6 shows the proportion of high-risk drinking groups (over 60 grams per week, drinking twice a week) by gender and age per the Korea National Health & Nutrition Examination Survey 2014.[17] Among men, the highest percentage of high-risk drinkers were in their 30s, with 26.2% of those in their 30s classified as high-risk drinkers, Even in their 40s, the difference is insignificant, with 26.0% of those in their 40s reflecting high-risk drinking

Table 6. Estimation of high-risk drinkers by gender and age based on KNHANES

Gender and age		N	Ratio (%)	S.D.	Population[1)]	High-risk drinkers[2)]	Drinkers, past 12 months[3)]
Male	19-29	239	14.6	2.9	3,555,134	519,050	
	30-39	378	26.2	2.7	3,868,887	1,013,648	
	40-49	365	26.0	2.5	4,464,662	1,160,812	
	50-59	400	24.8	2.4	4,248,652	1,053,666	
	60-69	406	14.0	2.2	2,590,777	362,709	
	70+	367	6.6	1.4	1,869,504	123,387	
Total (including under 19)					25,820,488	4,233,272	14,407,832
Female	19-29	355	8.9	1.8	3,193,250	284,199	
	30-39	526	9.1	1.7	3,701,212	336,810	
	40-49	536	7.1	1.1	4,330,828	307,489	
	50-59	596	4.5	1.0	4,159,876	187,194	
	60-69	513	1.4	0.6	2,740,856	38,372	
	70+	518	1.0	0.5	2,858,223	28,582	
Total (including under 19)					25,856,566	1,182,646	8,791,232

[1)]Population distribution by gender and age in 2016
[2)]High-risk drinkers=high-risk drinker ratio×population in 2016
[3)]Drinkers=population in 2016–(population in 2016×abstainers ratio, past 12 months)

groups, and slightly declining to 24.8% among those in their 50s as the age increased. It can be interpreted that the percentage of high-risk drinkers did not decrease as the age increased, although drinking may be frequent among those in their 30s due to active social activities. Women in high-risk drinking groups tend to reflect younger age groups than men. Among women, the highest percentage of high-risk drinkers was in their 30s, with 9.1% of those in their 30s classified as high-risk drinkers, even in their 20s, the difference is insignificant, with 8.9% of those in their 20s reflecting high-risk drinking groups, The rate of high-risk drinkers remained at 7.1% among people in their 40s. The proportion of high-risk drinkers showed a significant decrease as the age increased.

When applying the average ratio of high-risk drinking groups in Table 6 to the population distribution (KOSIS, Drinking and Health Management, 2012) by gender and age surveyed by the National Statistical Office in 2016, a number of high-risk drinkers by age and gender were available. As a result, a male population of 4,233,272 (16.4%) and a female population of 1,182,646 (4.6%) were expected to be high-risk group.

The figure is almost similar to the 12.1% rate of high-risk drinkers in Korea (reported as aged 15 or older) surveyed by the WHO.[16)] The national health data are subject to investigation for those aged 19 or older. For women, the ratio of high-risk groups is 4.6% for all women, a significant difference from the 0.1% figure reported to WHO (15 and older). As women are still not free from the conventional social norms of drinking, it is assumed that they tend to reduce drinking. Therefore, it is believed that when investigating women's drinking patterns, a way to infer the actual state with a diversified questionnaire rather than a simple question or a single-answer question format, is needed.

If the 12-month rate of abstainers reported in the WHO's High-Risk and Prohibition rates is divided by gender and excluded from the number of drinkers, the actual drinkers are 14,407,832 males and 8,791,232 females, as shown in Table 6. This shows

Table 7. Total share of alcohol consumption by alcohol problem group (age 19+) based on KNHANES

		Dependence	Abuse	Problem	Normal
Total	Population %	5.6	5.8	20.1	68.5
	Alcohol consumption %	28.3	21.6	39.0	11.1
Male	Population %	9.6	10.0	30.2	50.2
	Alcohol consumption %	30.3	23.3	38.8	7.6
Female	Population %	1.5	1.8	10.0	89.7
	Alcohol consumption %	19.1	13.8	39.9	27.2

Source: KNHANES V (2014)

that 29.4% of men and 13.5% of women who actually drink are high-risk drinkers.

The reason for calculating the number of drinkers and high-risk drinkers is to track the actual drinking ratio with objective data, as it is difficult to know the exat figures from the survey.

4. High-risk drinkers' drinking patterns

4.1. Total consumption rate and type of liquors consumed by alcohol problem group

The WHO has developed an AUDIT (Alcohol Use Disorders Identification Test) questionnaire to determine alcohol intake patterns. Based on the level of actual alcohol intake that was recorded based on respondents' answers to 10 questions, 0 to 8 points are normal, 8 to 15 points indicate a problem drinking, 16 to 19 points indicate alcohol abuse, and 20 points or higher indicate problem groups for alcohol consumption.[23)]

The following table shows the alcohol consumption patterns of adults and the total alcohol consumption rate of each alcohol problem group. In Korea, about half (50.2%) of all men showed normal alcohol consumption patterns, while the other half showed problems (30.2%), abuse (10.0%), and even dependencies (9.6%). Moreover, the problem, abuse and dependency groups (49.8% of male) consumed 92.4% of total alcohol consumption among the male population, the majority of the alcohol consumption among males. In particular, the dependency group showed that 9.6% of men consume more than 30% of the total alcohol intake among the male population, indicating that men's dependence on alcohol is a serious issue.

In particular, it was possible to infer that alcohol consumption in some vulnerable groups was very high. Among women, 89.7% showed normal alcohol consumption patterns, followed by patterns associated with problems (10.0%), abuse (1.8%), and dependence (1.5%). The rate of alcohol consumption was skewed to such an extent that 13.3% of non-normal groups constituted 72.8% of total alcohol consumption among female. In the case of women, the size of the groups that were characterized by problems, abuse, and dependence (13.3%) was significantly different than the figures shown in WHO (0.1%) and the national health data (4.6%), indicating that it is difficult to comprehend the status of women in alcohol consumption.

This study also examined the effects of alcohol intake on the types of alcohol beverages. As shown in Table 8, the breakdown of alcohol consumed by type among men in the normal intake group is 57.1% soju, 28.4% beer, and 14.4% makgeolli. In problem groups, abuse groups and dependent groups, the types of alcohol consumed can be observed as progressing from beer and makgeolli to soju, which has a high alcohol level. In the case of the normal consumption group among women, beer (45.0%) accounted for more consumption ratio than soju (41.0%). In the problem group, the abuse group, and the dependency group, the trend of progressing alcohol consumed by type, primarily from beer and makgeolli to soju, is similar to that of men. The

Table 8. Liquor consumption ratio by alcohol consumption status (%)

		Soju	Beer	Makgeolli
Total (%)		68.5	21.8	9.7
Male	Normal	57.1	28.4	14.4
	Problem	70.9	19.5	9.6
	Abuse	72.3	18.5	9.1
	Dependence	76.9	13.9	9.2
Female	Normal	41.0	45.0	14.1
	Problem	59.3	33.1	7.7
	Abuse	73.3	22.2	4.6
	Dependence	64.6	27.5	7.9

Source: Ministry of Health & Welfare Alcohol Report 2014

share of soju was slightly lower and the proportion of beer was slightly increased in the case of the dependent group in comparison with the abuse group.

4.2. Differences between high-risk and average drinkers

In order to examine the difference between high-risk and average drinkers in Korea, this study compared and calculated the difference based on the amount of consumption by type of alcohol and the number of drinkers by gender. Assuming that high-risk drinkers consume only one type of alcohol at a time, the alcohol intake in high-risk drinking groups can be obtained by dividing 60 g of alcohol by the standard alcohol level. This calculation results in 857.1 mL of makgeolli (7 alcohol level) being consumed at a time, 1,500 mL of beer (4 alcohol level), and 240 mL of diluted soju (25 alcohol level). This is to compare the average intake with the intake of the risk group to determine the level of risk of the general intake.

If the consumption per liquor type is multiplied by the standard alcohol concentration, the total pure alcohol consumption will be 9,610 liters based on the 2014 data on the production, import and export volume of liquors.

As shown in Table 9, the alcohol share for each type of alcohol was calculated by dividing the alcohol consumption by the alcohol standard level and by the total alcohol consumption. As of 2014, the data showed that diluted soju accounted for 62% of Korea's total alcohol consumption, while beer accounted for 22.5% and makgeolli accounted for 7.8%.

According to this share of alcohol consumption, men who consume 37.6 liters of alcohol, the annual alcohol consumption of male drinkers in Korea, are consuming 211.3 liters of beer, 41.9 liters of Makgeolli and 93.1 liters of soju per year. These figures are calculated by the consumption of 2,031 mL of beer and 895.2 mL of soju at once by male drinkers.

These amounts are far higher than the 240 mL of soju or 1,500.0 mL of beer, assuming that the high-

Table 9. Estimation of liquor ingestion amount by high-risk group and by drinker population

	Std. alc. conc. (%)	Single intake amount of high-risk group (mL)[1)]	Alcohol consumption ratio (%)[2)]	Annual intake amount,male (L)[3)]	Single intake amount, male (mL)[4)]	Annual intake amount, female (L)[5)]	Single intake amount, female (mL)[6)]
Makgeolli	7	857.1	7.80	41.9	402.9	12.82	123.3
Beer	4	1,500.0	22.48	211.3	2,031.7	64.63	621.4
Soju	25	240.0	61.92	93.1	895.2	28.47	273.8

[1)]Single intake amount of high-risk group (mL)=spirit 60g/std. alc. conc.
[2)]Alcohol consumption ratio (%)=(forwarding quantity by type * std. alc. conc./total alcohol consumption)*100
[3)]Annual intake amount, male (L)=(WHO alcohol per capita consumption, male drinkers only * alcohol share/std. alc. conc.
[4)]Single intake amount, male (mL)=(Annual intake amount, male)/52wks * 2 times per wk
[5)]Annual intake amount, female (L)=(WHO alcohol per capita consumption, female drinkers only * alcohol share)/std. alc. conc.
[6)]Single intake amount, female (mL)=(Annual intake amount, female)/52wks * 2 times per wk

Table 10. Consumption of dependent groups using alcohol consumption by type

	Std. alc. conc. (%)	Annual alcohol consumption (kL)	Alcohol consumption ratio (%)	Total alcohol consumption of dep.group (kL)[1)]	Alcohol consumption per capita of dep.group (L)[2)]	Annual intake amount per capita of dep.group L/yr[3)]	Single intake amount of dep. group (mL)[4)]
Makgeolli	7	3,0162.7	7.80	8,536	2.95	42.14	405.2
Beer	4	86,938.9	22.48	24,603.7	8.50	212.55	2,043.8
Soju	25	239,454.5	61.92	67,765.6	23.42	93.67	900.7
Total		386,721.6					

[1)]Total alcohol consumption of dep.group=annual alcohol consumption *28.3%
[2)]Alcohol consumption per capita of dep.group=total alcohol consumption of dep.group/population of dep. group
[3)]Annual intake amount per capita of dep.group=annual alcohol consumption * 28.3%/population of dep. group*std. alc. conc.
[4)]Single intake amount of dep. group=Annual intake amount per capita of dep.group/52wks/2 times

risk group drinks (spirit 60 g) only type of liquor in a single session. This means that the average amount of drinking among men seems to have already exceeded the level of high-risk drinking (in spite of the average drinking rate). In women who reported 11.5 liters of alcohol a year, the rate was one-third that of men. However, women consumed 273.8 mL of soju, which was also high.

4.3. Alcohol consumption of dependent groups

The level of alcohol exposure in the group with the highest consumption is the most problematic. Using the results of the total consumption ratio (19 years and older) of each alcohol-dependent group in Table 7, 5.6% of the population consumes 28.3% of the total alcohol consumption. The total alcohol consumption of the dependent group is 67,765.6 kL of soju and 24,603.7 kL of beer. The case for a dependent alcohol intake group was calculated assuming that all types of alcohol are consumed at an average consumption rate. It was possible to calculate the amount of alcohol consumed by 2,893,915 people in the dependent group, which is 5.6% of the total population of 51,677,054. As a result, one dependent group assessed to be the most exposed to alcohol consumed 93.67 liters of soju, 42.14 liters of makgeolli, and 212.5 liters of beer in one year (annual intakes account per capita of Dep. group) as shown in Table 10. This data shows dependent group had consumed 900.7 mL of soju, 405.2 mL of makgeolli and 2,043.8 mL of beer, assuming that the dependent group had consumed alcohol twice a week for 52 weeks.

It should be taken into account that soju consumption is underestimated and that consumption of the other alcoholic beverages are slightly overvalued, considering that soju consumption is higher in groups with higher alcohol intake.

The amount of alcohol consumed by one person in a dependent group was compared with that of one male drinker (Table 9). In the past year, the average drinker consumed 2,031 mL of beer and 895.2 mL of soju. These amounts are very similar to the intake of alcohol-dependent groups (2,043.8 mL of beer and 900.7 mL of soju). That is, it may be inferred that men who drink are all dependent consumers of alcohol.

IV. Consideration and Conclusion

Excessive drinking has directly linked to health and indirectly related to many problems in society. Accurately understanding the aspects of alcohol consumption is essential to establishing a basic framework for the national health policy. However, in many studies on alcohol, the survey on actual

alcohol intake is insufficient, as most studies on intake frequency are conducted. Even this is the average amount of alcohol consumed by drinkers and those who do not drink alcohol together, or the average alcohol intake by drinkers. In fact, the data is insufficient to determine the actual intake of high-risk groups or the size of high-risk groups that can cause health problems due to drinking.

Therefore, the average amount of drinking is very limited and should be approached with care.[25)]

WHO defines high-risk drinkers as those who consume more than 60 grams of alcohol at a time among men and 40 grams among women at least twice a week. This is less than two-thirds of soju at a time, a level that the general public does not recognize as dangerous to exercise discretion. Nevertheless, only 12.1% of men and 0.1% of women aged 15 and older are high-risk drinkers in Korea.[16)] The population that has practiced a total of 12 months of abstinence is represented by 44.2% of men aged 15 years and 66.0% of women. Thus, excluding the 12-month abstainers, the average alcohol consumption of drinkers will increase, which is about six times higher (among men) than that of the high-risk drinker criteria. 29.4% of male drinkers and 13.5% of female drinkers appear to be high-risk drinkers, which is much higher than the high-risk drinkers ratio reported in the World Health Organization data (21.6, 0.3%). The standard level of the average alcohol consumption of high-risk drinkers also indicates that Korea is heavily biased in drinking and that a large proportion of drinkers comprise high-risk drinkers.

Among men, the highest percentage of high-risk drinkers was those in their 30s. However, the difference is not particularly significant even in their 40s and 50s. It can be observed that high alcohol intake continues to be practiced even as the age increases. In the case of women, 9.1% of those in their 30s had the highest rate of high-risk drinkers, while the next high-risk age group was women in their 20s, which resulted in a relatively young age of high-risk drinkers. For women, this period overlaps with the period of active social activities. It also overlaps with the period of possible pregnancy, which requires extra care.

According to the KNHANES data and population data, 4,233,272 men (16.4% of all men) are in high-risk drinking groups, while 1,182,646 women (4.6% of all women) are in high-risk drinking groups.

Considering the WHO ratio of high-risk drinkers in Korea (reported as drinkers over 15 years of age), which is 12.1% for men and 0.1% for women and age (KHNHES data is over 19 years old), this level is considered similar for men. However, there is a significant difference in women. As women are still not free from social conventions about drinking, it is assumed that they tend to reduce their alcohol consumption. Therefore, it is believed that when investigating women's drinking patterns, a way to infer the actual state with a diversified questionnaire, rather than a simple question or a single-answer question, is needed.

According to the WHO AUDIT (Alcohol Use Disorders Identification Test) survey, 49.8% of men who are in problem, abuse, and dependent groups consumed 92.4% of the total alcohol consumption among males. In particular, 9.6% of dependent group men consume more than 30% of alcohol consumption, indicating that men's dependence on alcohol is a serious issue. Among women, the alcohol consumption rate was skewed to such an extent that 13.3% of non-normal groups accounted for 72.8% of alcohol consumption. For female drinkers, efforts will be needed to identify hidden risk groups.

When comparing the amount of alcohol consumed by one person in a dependent group to the amount of alcohol consumed by one man in one drinking session, the amount of alcohol consumed by a person who responded as having drunk over the past year is surprisingly similar to that of alcohol-dependent people. That is, it is no exaggeration to say that men are dependent consumers of alcohol and that the nation's drinking culture is thus not very

unhealthy.

As a result of the above, the level of alcohol intake is difficult to understand solely by examining the frequency of intake, and if the deviation of alcohol consumption is serious, the average intake level cannot be assured. It has indicated that the average drinker's intake may already be at risk and that there are a large number of dependent groups.

We have no specific price policy for drinking except liquor tax,[27] and there is no discrimination based on alcohol level.[28] It is also very insufficient to use the secured liquor tax for treating or preventing addiction patients. The regulation of liquor advertising is primarily educational. Moreover, campaign programs are known to have a low alcohol effect, while some are vague in substance or content. For a young audience, in particular, there are no sponsorship regulations for new media and sports/cultural events. Parker and others[29] say that the more people consume alcohol on average, the more society experiences problems. Therefore, it said that it is important to reduce the average alcohol consumption, and there was a strong link between the total alcohol consumption of the population and the prevalence of excessive drinkers. The total alcohol consumption of drinkers, excluding abstainers, is high enough to exceed the standard of consumption by dangerous groups. Furthermore, as the overall burden on society is increasing, the government should focus on reducing overall alcohol consumption (Alcohol control policy, paradigm shift 2012). So far, if only certain groups have approached the teaching method under the assumption that they are excessively consuming alcohol, it is important to recognize and approach a wider audience, that is, almost all drinkers, as a result of this study.

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