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Patrones de consume de alcohol en la población adulta del municipio Maracaibo, Zulia - Venezuela

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Abstract

Background and Objectives: Alcohol consumption is a widely distributed practice worldwide with several dose-dependent effects on health. The magnitude of these consequences is modified by cultural and sociodemographic factors which shape behaviors towards this habit. Therefore, the objective was to determine patterns of alcohol drinking in our population.

Materials and Methods: Descriptive, cross-sectional study with randomized, multi-staged sampling, which included 2,230 subjects of both genders. Monthly alcohol intake was interrogated, from which daily consumption was calculated in grams of alcohol and beverage volume equivalents. Habitual drinking was defined as >1 g/day. Results were expressed in medians and interquartile ranges. Consumption patterns were classified by quartile distribution and conglomerates for each gender and beverage type, obtained through two-staged cluster analysis.

Results: Daily alcohol intake is higher in males than in women, expressed in medians as follows: 28.4 g/day (9.5-47.3) vs 10.4 g/day (3.8-28.4); p=4.67x10^{-43}. From the general population, 16.7% (n=196) of women and 45% (n=478) of men were habitual drinkers (χ^2=220.185, p<0.001). Beer was the most frequent type of beverage in both genders (χ^2=24.760, p=4.20x10^{-6}). The largest percentage of habitual drinkers was in subjects aged 18-29 years: 37.2% (n=73) of females; and 36.1% (n=413) of males. Consumption categories were established for both genders through quartile distribution, for females: <3.79 g/day, 3.8-10.41 g/day, 10.42-28.40 g/day and ≥28.41 g/day; for males: <9.53 g/day, 9.54-28.40 g/day, 28.41-47.33 g/day and ≥47.34 g/day.

Conclusions: In our population, alcohol intake is greater in males and younger subjects. Distinct sociocultural characteristics render necessary the determination of population-specific consumption patterns.

Key words: alcohol, drinking patterns, types of beverages, quantity of consumption.

Introducción

Alcohol consumption is a widely distributed habit worldwide, which has evolved historically from being considered an illegal act, to its current conception as a socially accepted and enforced practice, profoundly engrained in numerous cultures[1]. This behavior persists despite the extensive list of harmful consequences it bears on human physiology, including pancreatic and hepatic damage, immunosuppression and carcinogenesis[2,3], as well as the broad catalogue of effects it has in the central nervous system, including propensity to accidents and substance dependence, which represent severe public health issues[4].

Nevertheless, alcohol intake remains a constant component within societies, with over 40% of the world's adult population consuming alcohol regularly[5]. Currently, inappropriate alcohol intake results in an estimate of 2.5 million premature deaths yearly, and represents 4.4% of the global burden of disease. It also remains a prominent risk factor for disability, occupying the third and first places in this regard worldwide and in the American continent, respectively. Furthermore, hazardous and harmful drinking patterns seem to be on the rise among adolescents and young adults[6]. Despite these alarming figures, abundant evidence describes a "J-shaped" dose-effect curve for alcohol, conferring beneficial effects, such as lipid profile improvement and insulin-sensitizing activity with low-moderate consumption of some alcoholic beverages, although these are attenuated or lost as intake amounts increase[7].

In this aspect, quantitative and qualitative features of alcohol consumption patterns appear to be highly specific to distinct demographies[5]. Geography bears a strong in-

fluence over these behaviors, with factors such as latitude, weather, availability of raw materials for alcoholic beverage production, and urbanization thoroughly shaping consumption patterns for each particular population[8]. As a result, regions across the world have developed unique behaviors toward alcohol intake, regarding both amount and type of beverages consumed, spanning tendencies as different as the binge drinking-prone Nordic societies, to the more restrained Middle Eastern culture, at either ends of the spectrum[6]. Moreover, idiosyncrasies in these patterns are further conditioned by internal characteristics of each society, particularly those related to socioeconomic status and cultural background of subject subsets within populations[9,10].

The importance of the geographic, sociocultural and demographic environment surrounding alcohol consumption is crystallized in concepts such as the "French paradox" and the "Mediterranean diet", wherein alcohol intake and other psychosocial habits appear to play a key role regarding the low prevalence of cardiovascular disease (CVD) observed in these populations,[11,12] in apparent contradiction to the traditional and more well-known deleterious effects of alcohol intake. In these contexts, alcohol appears to favorably interact with the sociocultural backdrops of these populations, translating into beneficial outcomes[13]. In spite of these benefits, in most populations, the adverse consequences of alcohol consumption appear to eclipse its benefits. This phenomenon may stem from factors such as the high caloric supply of alcoholic beverages, dietary substitution for alcohol, and a psychosocial environment promoting excess intake, which are important elements that obscure the potential for therapeutic or preventive recommendation of alcohol regarding cardiometabolic disease[14].

Alcohol consumption patterns are largely unexplored in our population despite the ubiquity of this habit, with very few previous studies exploring this aspect. In consequence, the role of our own tendencies regarding alcohol quantity and quality and their relationship with either beneficial or harmful outcomes remains poorly understood. Given this scenario, and the constantly growing prevalence of MS, DM2 and CVD at worldwide, national and regional levels[15,16], the objective of this study is to characterize and describe patterns of alcohol consumption in our population, in order to elucidate the potential role of alcohol intake regarding cardiometabolic health in our demography.

Materiales y métodos

Population Selection

The Maracaibo City Metabolic Syndrome Prevalence Study (MMSPS) is a cross-sectional study whose purpose is to identify Metabolic Syndrome and cardiovascular risk factors in the adult population of the Maracaibo, the second largest city of Venezuela, with approximately 2,500,000 inhabitants. The methodological process for representative sample selection has been previously published elsewhere[17]. All participants signed a written consent prior to any involvement, interrogation, physical examination or laboratory testing. All procedures were approved by the Ethics Committee of the Endocrine and Metabolic Diseases Research Center from the University of Zulia – Venezuela. Every individual was subjected to a routine medical examination using the clinical chart provided by the Health and Social Development Ministry of Venezuela as the data collecting tool.

Subject Evaluation

Data were collected through completion of a full clinical record carried out by trained personnel, which included interrogation regarding ethnic origin, socioeconomic status by the Graffar scale according to Méndez-Castellano[18], marital status (Single, Married/Co-Habiting or Divorced), occupational status (Employed or Unemployed), and educational status, under the following definitions: a) Illiterate, subjects with no Reading or writing skills; b) Lower Education, those who finished primary, middle or high school; and c) High Education, those who attended or finished college/university.

Alcohol Consumption

For the assessment of alcohol intake, subjects were asked to estimate the amount of alcoholic drinks they consumed monthly; in this stage, drinkers or non-abstainers were defined as those who took at least one drink per month. This subset was then asked to report an approximate average quantity and frequency of daily intake for each type of drink: Beer, Spirits, and Wine and its derivatives. In order to estimate total alcohol consumed, daily drink milliliters (mL) were determined based on standard drink content for each kind of beverage: Beer (222 mL, 4.5° of alcohol), Spirits (30 ml, 40° of alcohol), Wine and derivatives (100 ml, 7.5° of alcohol)[19]. Finally, daily intake of alcohol grams was calculated through the following formula[20]:

$$\frac{\text{Daily Consumed (mL)} \times \text{Degrees of Alcohol} \times 0,8}{100}$$

Where 0.8 is a constant representing ethanol density in drinks. Based on this estimation, habitual drinkers were defined as subjects who consumed ≥1 gram of alcohol daily[21].

Statistical Analysis

Qualitative variables were expressed as absolute and relative frequencies, and statistically analyzed through the Z test for Proportions and the c^2 test. Normality of distribution of continuous variables was evaluated by using

Geary's test. Daily alcohol intake was represented in medians and p25 and p75th given its non-normal distribution. Differences amongst groups were determined with U Mann Whitney (two groups) or Kruskal-Wallis test (three or more groups). The database analysis was done using the Statistical Package for the Social Sciences (SPSS) v. 20 for Windows (IBM Inc. Chicago, IL). Results were considered statistically significant when p<0,05.

Patterns of Alcohol Consumption

For the establishment of alcohol intake patterns in our population, habitual drinkers (taking ≥1 g daily) were initially selected, and then categorized through 2 methods:

1. Quantitative daily alcohol intake was classified in quartiles for each gender (Table 1).

2. Quantitative daily alcohol intake was classified in 3 categories by gender and type of beverage, through two-staged cluster analysis (Figure 1 - Table 2). Cluster analysis allows separation of patterns into clusters, sets or groups, according to distance criteria.

General characteristics of the population

The studied sample consisted of 2,230 individuals, with 1,172 women (52.6%) and 1,058 men (47.4%). The mean age of the general population was 39.3±15.3 years. Sociodemographic characteristics according to gender are shown in Table 3.

Prevalence of habitual drinking and types of alcoholic drinks

Figure 2-Panel A depicts the distribution of habitual drinkers (≥1gr/day) by gender, where 16.7% (n=196) of females and 45% (n=478) of males were found to fit our definition of habitual alcohol consumption (χ^2=220.185, p<0.001; Z Proportion Test <0.05 between genders). When assessing the types of drinks taken by these subjects (Figure 2-Panel B), beer was determined to be the most frequently beverage consumed in both genders, with 76.2 % (n=364) and 72.4% (n=142) for men and women respectively (Z Proportion Test: Beer vs. Other drinks; p<0.05 in both genders); whereas drinking of wine and its derivatives was the least prevalent in both males and females with 6.6% (n=13) and 0.4% (n=2) respectively (χ^2=24.760; p=4.20x10^{-6}).

Habitual drinking and age groups

Figure 3 shows the distribution of habitual drinking by gender and age groups. Gender is associated with habitual drinking, with χ^2=9.510 (p=0.023) and for females χ^2=19.291 (p=2.38x10^{-4}). A decrease in the frequency of this habit can be observed as age increases, with the largest proportion of habitual drinkers in the age group 18-29 years, with Females 37.2%, n=73; Males 36.1%,

n=413. Differences between groups within each gender were only ascertained in females (Group aged ≥60 years vs. other categories; p<0.05).

Daily alcohol intake and sociodemographic variables

When assessing daily intake of alcohol by gender, males were found to be heavier drinkers than females, with 28.4 g/day (9.5-47.3) vs. 10.4 g/day (3.8-28.4); p=4.67x10^{43}. Regarding the age groups, differences within genders were found in both genders; in females, the greatest consumption was in the age group ≥60 years with 39.4 g/day (13.3-69.6);p=1.9^{x}10^{-4}. In males, the greatest intake was found in those aged 30-44 years, with 30.2 g/day (12.9-64.0); p=0.006. In regards to other sociodemographic variables evaluated in our study, daily alcohol consumption was associated with socioeconomic status in both genders, the greater consumption was found in Strata IV and V, with 18.9 g/day (7.6-34.1) for females [p=4.38x10^{-6}] and 34.1 g/day (15.2-68.2) for males [p=9.20x10^{-8}].

Daily alcohol consumption was also associated with marital status, in females the greater consumption was in the divorced group with 18.9 g/day (11.4-28.4) [p=0.030]; conversely, in the male group the greatest consumption was in the singles group with 32.0 g/day (12.8-68.2) [p=0.040]. Differences regarding educational status and occupational status were only significant in men, with p=0.005 and p=0.021 respectively, with greater consumption in the illiterate group 28.4 g/day (17.0-37.9) and in the employed group with 28.4 g/day (11.4-56.8).

Classification of alcohol consumption

Table 5 shows the equivalent in milliliters for the 25th, 50th and 75th percentiles of daily alcohol intake for each type of drink (beer, spirits, and wine). The average alcohol intake was 10.41 g/day (3.79-28.40) in women; which corresponds to 289.2 mL of beer, 173.5 mL of wine, and 35.5 mL of spirits. Meanwhile, average consumption was 28.40 g/day for men, equating to 788.9 mL of beer, 473.3 mL of wine, and 88.8 mL of spirits. Following allocation of habitual drinkers through cluster analysis according to daily intake and type of drink, three categories were yielded for each gender. Table 6 summarizes the allocation of subjects for these groups, as well as their average daily intake and volume equivalent for each kind of drink.

Table 1. Quartile distribution of daily alcohol intake by gender. Maracaibo, 2014.

	Alcohol Intake (g/day)			
	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Females	< 3.79	3.80-10.41	10.42-28.40	≥ 28.41
Males	< 9.53	9.54-28.40	28.41-47.33	≥ 47.34

Resultados

Figure 1. Diagram showing the processing of the sample applying two-staged Cluster analysis for categorizing subjects according to gender, type of beverage and daily alcohol intake
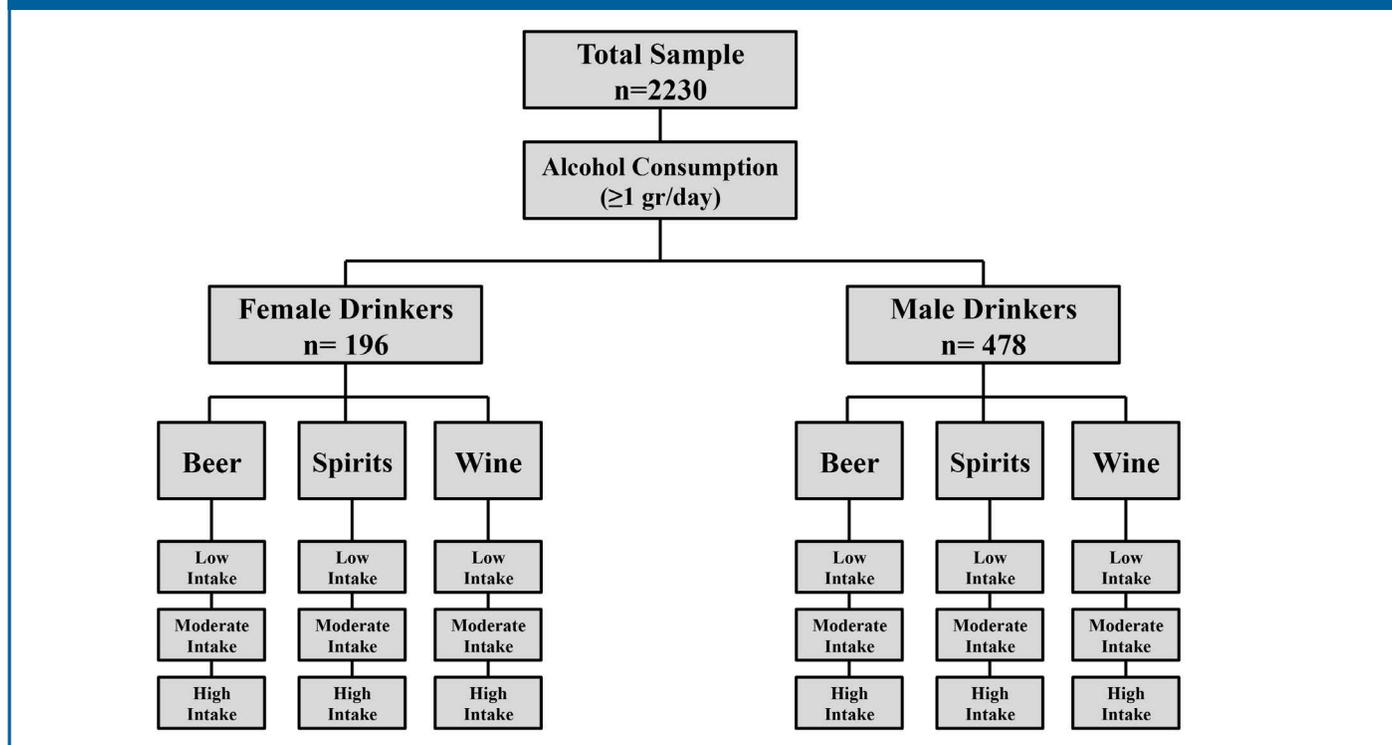

Table 2. Distribution of drinkers by two-staged cluster analysis according to gender, type of beverage and daily alcohol intake.

	Type of alcoholic beverage		
	Beer	Spirits	Wine
	n (%)	n (%)	n (%)
Females			
Low Intake	120 (84.5%)	31 (75.6%)	9 (69.2%)
Moderate Intake	17 (12%)	8 (19.5%)	2 (15.4%)
High Intake	5 (3.5%)	2 (4.9%)	2 (15.4%)
Males			
Low Intake	248 (68.1%)	79 (70.5%)	1 (50%)
Moderate Intake	92 (25.3%)	31 (27.7%)	1 (50%)
High Intake	24 (6.6%)	2 (1.8%)	0 (0%)

Table 3. Characteristics of the general population by gender. Maracaibo, 2014

	Females (n=1172)		Males (n=1058)		Total (n=2230)	
	n	%	n	%	n	%
Age Groups (years)						
18-29	349	29.8	413	39.0	762	34.2
30-44	325	27.7	297	28.1	622	27.9
45-59	346	29.5	259	24.5	605	27.1
≥60	152	13.0	89	8.4	241	10.8
Ethnic Group						
Mixed	876	74.7	816	77.1	1692	75.9
Hispanic White	191	16.3	161	15.2	352	15.8
Afro-Venezuelan	30	2.6	36	3.4	66	3.0
Amerindian	62	5.3	44	4.2	106	4.8
Others	13	1.1	1	0.1	14	0.6
Socioeconomic Status						
Strata I and II	225	19.2	224	21.2	449	20.1
Strata III	432	36.9	446	42.2	878	39.4
Strata IV and V	515	43.9	388	36.7	903	40.5
Educational Status						
Illiterate	33	2.8	19	1.8	52	2.3
Lower Education	757	64.6	637	60.2	1394	62.5
Higher Education	382	32.6	402	38.0	784	35.2
Occupational Status						
Unemployed	642	54.8	291	27.5	933	41.8
Employed	530	45.2	767	72.5	1297	58.2
Marital Status						
Single	495	44.8	459	44.3	954	44.6
Married/Cohabiting	543	49.1	550	53.1	1093	51.1
Divorced	67	6.1	26	2.5	93	4.3

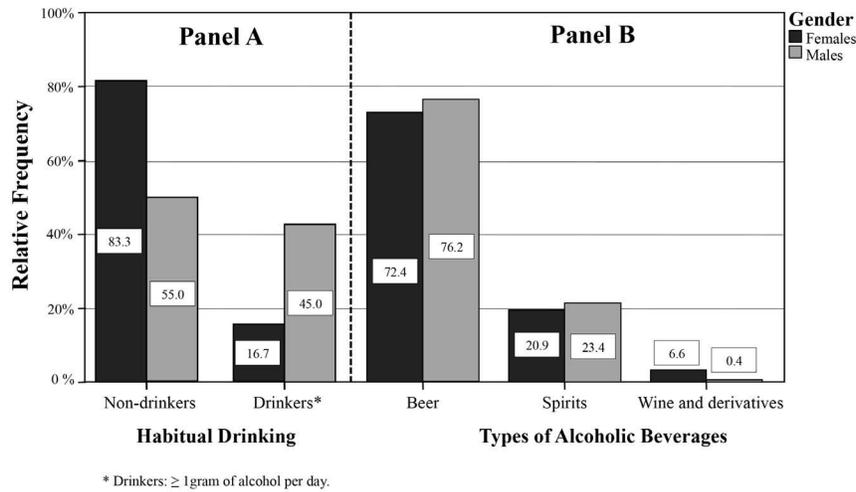**Figure 2. Frequency of habitual drinking and types of alcoholic beverages by gender. Maracaibo, 2014**

* Drinkers: ≥ 1gram of alcohol per day.

Figure 3. Epidemiologic behavior of habitual drinking by age groups and gender. Maracaibo, 2014.
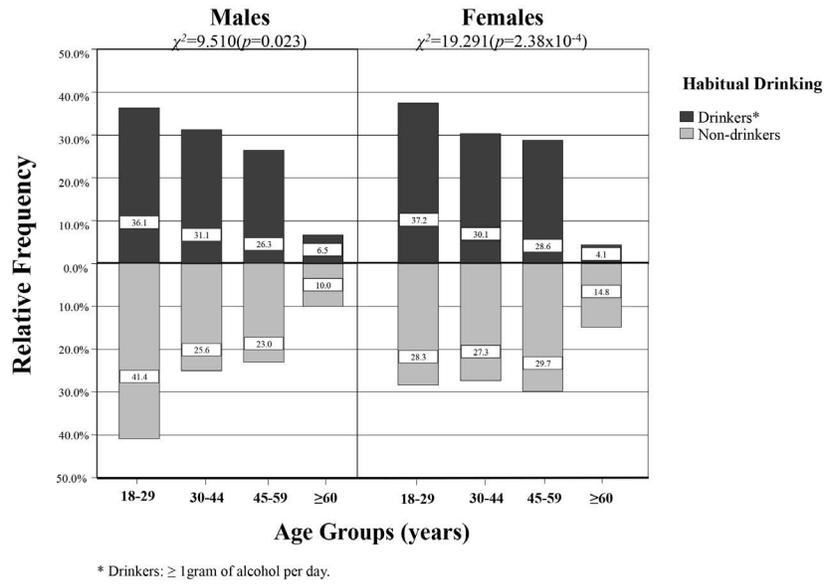

* Drinkers: ≥ 1gram of alcohol per day.

Table 4. Epidemiologic behavior of daily alcohol intake by sociodemographic variables and gender. Maracaibo, 2014

	Alcohol Intake (gr/day)					
	Females			Males		
	Median	p25-p75	p	Median	p25-p75	p
Gender*	10.4	3.8-28.4		28.4	9.5-47.3	
Age Groups (Years)[a]			1,9x10⁻⁴			0.006
18-29	7.1	2.6-28.4		28.4	9.5-43.3	
30-44	11.4	4.7-22.7		30.2	12.9-64.0	
45-59	13.0	2.6-18.9		19.2	9.5-39.8	
≥60	39.4	13.3-69.6		17.0	3.8-32.0	
Ethnic Groups[a]			0.287			0.109
Mixed	11.4	3.8-28.4		28.4	9.5-51.1	
Hispanic White	7.6	2.1-18.9		18.9	9.5-37.9	
Afrovenezuelan	18.9	9.2-68.2		31.2	17.0-37.9	
Amerindian	11.1	4.3-17.0		38.8	34.1-68.2	
Others	31.2	28.4-34.1		28.4	-	
Socioeconomic Status[a]			4.38x10⁻⁶			9.20x10⁻⁸
Strata I y II	3.8	1.9-11.4		14.2	6.4-28.4	
Strata III	9.3	2.9-18.9		28.4	13.6-45.8	
Strata IV y V	18.9	7.6-34.1		34.1	15.2-68.2	
Marital Status[a]			0.030			0.040
Single	6.4	2.6-19.9		32.0	12.8-68.2	
Married/ Cohabiting	12.8	4.7-28.4		24.0	9.5-37.9	
Divorced	18.9	11.4-28.4		16.1	7.6-28.8	
Educational Status[a]			0.102			0.005
Illiterate	17.0	-		28.4	17.0-37.9	
Lower Education	13.3	3.8-34.1		28.4	14.2-67.2	
Higher Education	7.8	2.6-18.9		18.9	7.7-37.9	
Occupational Status[b]			0.864			0.021
Unemployed	9.5	3.2-28.4		18.9	8.0-3.1	
Employed	11.4	3.8-18.9		28.4	11.4-56.8	

* Mann-Whitney's U Test between genders: *p*=4.67x10⁻⁴³
[a] Kruskal-Wallis' Test within each gender.   [b] Mann-Whitney's U Test within each gender.

Table 5. Quartile distribution of daily alcohol intake by gender and equivalent volume by type of beverage. Maracaibo, 2014

			Type of alcoholic beverage (mL)		
		g/day†	Beer*	Spirits*	Wine*
p25	Females	3.8	105.3	11.8	63.2
	Males	9.5	264.7	29.8	158.8
p50	Females	10.4	289.2	35.5	173.5
	Males	28.4	788.9	88.8	473.3
p75	Females	28.4	788.9	88.8	473.3
	Males	47.3	1314.7	147.9	788.8

† Daily alcohol intake.
* Equivalent volume of beverage (mL).
1 Beer= 220 mL.
1 Spirit drink= 30 mL.
1 Glass of wine= 120 mL.

Table 6. Distribution of drinkers by cluster analysis according to gender, type of beverage and daily alcohol intake, with median daily alcohol intake and volume equivalent. Maracaibo, 2014

	Type of alcoholic beverage								
	Beer			Spirits			Wine		
	n (%)	Median†	mL*	n (%)	Median†	mL*	n (%)	Median†	mL*
Females									
Low Intake	120 (84.5%)	14.2	394.4	31 (75.6%)	1.9	5.9	9 (69.2%)	2.3	38.3
Moderate Intake	17 (12%)	68.2	1894.4	8 (19.5%)	8.5	26.6	2 (15.4%)	10.8	180
High Intake	5 (3.5%)	136.3	3786.1	2 (4.9%)	38.4	120	2 (15.4%)	17.7	295
Males									
Low Intake	248 (68.1%)	18.9	525	79 (70.5%)	7.7	24,1	1 (50%)	5.4	90
Moderate Intake	92 (25.3%)	68.2	1894.4	31 (27.7%)	32.0	100	1(50%)	5.8	96.7
High Intake	24 (6.6%)	136.3	3786.1	2 (1.8%)	133.1	415.9	0 (0%)	-	-

† Daily alcohol intake (g/day).
* Equivalent volume of alcohol (mL).
1 Beer= 220 mL.
1 Spirit drink= 30 mL.
1 Glass of wine= 120 mL.

Discusión

Patterns of alcohol consumption display broad variability worldwide, with tendencies and behaviors autochthonous to each region in question[5], which are profoundly modeled by geographic, sociodemographic and cultural factors[22]. Although alcohol intake is generally conceived as a harmful practice due to its wide array of deleterious effects in several organ systems[23]; numerous reports describe highly specific drinking patterns that appear beneficial in the cardiometabolic sphere[24,25]. Therefore, it is of utmost importance to characterize drinking patterns within each demographic setting, in order to determine and describe their relationship with beneficial or detrimental health effects in each region.

In our population, habitual drinking showed marked differences between genders, being present in 45% of men and only 16.7% of women. This predominance among males is a constant finding in multiple nations across America, Europe, Asia and Oceania as reported by the multinational GENACIS project[26]. Nevertheless, these figures are lower than those published by the WHO not only for the American region (55% in women and 75% in men) but also worldwide (44% in women and 55% in men), wherein habitual drinking was defined as any alcohol intake in the 12 preceding months[27].

A broad catalogue of biologic and social factors may contribute to this gender asymmetry. Among biologic aspects, a potential greater susceptibility to the effects of alcohol in females may discourage its consumption in this gender,

although evidences are still inconclusive[28]. On the other hand, traditional Westernized psychosocial gender roles may play a part in this phenomenon, apparently offering more tolerance and encouragement towards irresponsible or dangerous drinking behaviors to males rather than females[29]. Additionally, in societies where women occupy central roles in family structures –as described in Venezuela[30]– self-limitation of alcohol intake may be perceived as a desirable or normatively expected trait in females[31].

Regarding the types of beverages consumed, in our population both genders showed predilection for beer over spirits and wine or its derivatives. This trend deviates from that observed worldwide, where spirits are the most consumed, followed by beer, and lastly, wine and its derivatives[27]. Regional preference for specific types of drinks is fundamentally dictated by geographic and socioeconomic factors. Indeed, because economic availability bears a heavy influence on drink predilection[32], wine intake only prevails in territories with favorable climate and soil conditions for grape cultivation –mainly in Mediterranean-like environments– which allow for increased regional production of this beverage, lower costs and by extension, easier acquisition. In contrast, ingredients for preparation of beer and spirits are generally more readily available worldwide, facilitating their production in countries such as Venezuela[33].

Heavy alcohol consumption is a serious problem in young adults and the physical, familial and financial consequences of excessive alcohol intake are enormous[34]. In our population, consumption patterns by age were similar in both genders, with larger proportions of habitual drinkers among younger subjects, progressively decreasing with age. This trend harmonizes with that found in other Westernized latitudes, such as the United States of America[35] and almost all of the Latin American territory, including Argentina, Brazil and Mexico; in contrast with Central European and Asian populations, where most drinkers were older in age[26]. In this aspect, cultural constructs and social structures intrinsic to each demography also determine intake tendencies; the greater concentration of drinkers in young ages may be due to early initiation of drinking practices within this age group[36] –which is in turn related to high-risk alcohol-related behaviors[37]–, use of alcoholic carbonate drinks, known as 'alcopops', which is equated with more problematic drinking patterns such as more frequent drinking, earlier onset of alcohol consumption, drunkenness and more alcohol-related negative consequences[6] and sociocultural encouragement towards drinking in this population subset[38]

Socioeconomic status was also associated with specific intake trends. In both genders, the highest alcohol consumption was in Strata IV and V. The features of the link between socioeconomic status and drinking practices appear to be highly region-specific: Our findings contrast with reports from South Africa –where lower strata tend to be lighter consumers[39]– yet resemble findings by Zhou et al.[40]

in two rural Chinese settings, wherein subjects with lower incomes showed the largest alcohol intake. This behavior has been related to low pricing of alcoholic beverages, as well as their illegal sale and homemade preparation[41].

When analyzing alcohol intake by occupational and educational status, only men showed significant differences. Regarding the former, in our population unemployed subjects were shown to drink more than their employed homologues, differing from a study in Russia which indicated unemployed individuals to be heavier drinkers[42]. Nevertheless, our findings harmonize with those in a South African population, with increased intake among employed subjects, which has been proposed to be due to higher acquisitive power[39]. Regarding educational status, lower consumption was found among subjects with greater levels of education, echoing previous reports by Helasoja et al.[43] in Baltic states. Similarly, Zhou et al.[40] have described a low educational status to be a risk factor for increased alcohol intake. Likewise, in certain populations, individuals with higher education may drink more frequently yet in lower quantities, as opposed to less frequent yet more copious drinking by subjects with lower educational status, a differential behavior which may contribute to these findings[44].

Our population displayed gender differences regarding marital status and alcohol intake. Among females, divorced individuals were the heaviest drinkers; as previously described by Helasoja et al. and Yim et al.[43,45] who found greater probability of elevated alcohol intake among women in this group. Hypotheses proposed to explain this distribution include increased psychosocial stress due to greater aggregated responsibility for achieving spouse-independent economic and familiar support[45]. Among males, single subjects showed the greatest consumption, in concert with findings from Brazil[46], China[47] and Baltic States[43], and even worldwide[48]; whereas married men tend to consume less alcohol[41].

Given the impact of all these cultural, demographic and socioeconomic on drinking patterns, several studies across the world have attempted to assess and stratify alcohol intake, in order to characterize dose-effect relationships in each population, and their consequences at mid- and long-term. Due to marked differences in quantity, kind and composition of alcoholic beverages worldwide, methods for its evaluation differ significantly, resulting in broadly variable classifications of consumption. However, large studies such as NHANES III[49] utilize simple and objective methodology for analysis of this aspect, by calculating consumption in daily grams of alcohol, and establishing gender-specific intake categories based on quartiles of this quantitative variable.

Nonetheless, the quartiles proposed by NHANES III are notoriously higher than those found in our study (Table 3)[49]. Others, such as the Melbourne Collaborative Cohort

Study[21] carried out in 36,964 Australians; also established consumption categories based on daily alcohol intake in grams, yet did not account for gender-specific differences, and may have implemented rather arbitrary stratification methods for their determination.

In this context, in order to more broadly evaluate our drinking patterns, cluster analysis was utilized as a less arbitrary complementary tool for the classification of alcoholic habits in our population. Cluster analysis is a multivariate statistic technique that renders groups of elements with the maximum possible homogeneity within each category, yet also greatest difference among groups[50]. Although this method has been used to describe patterns regarding psychobiological variables such as dietary habits[50,51], studies employing this tool to assess alcoholic drink consumption remain scarce[52].

Finally, it is important to highlight the exploratory and preliminary nature of this report, which aims to exhibit different models for the classification of alcohol intake, upon which further analyses will be based, focused on the detection of possible links between alcohol intake patterns and various cardiometabolic alterations in our population, particularly the Metabolic Syndrome.

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