1 INTRODUCTION

Excessive alcohol use amongst university students is a major public health concern. Heavy alcohol intake amongst the student population has implications for individual and educational institutions as well as for the wider society. Students have been reported to drink at higher levels than their non-student peers (1), making this an issue of public health concern, given the negative social and health consequences of heavy alcohol intake and the link with other unhealthy behaviours (e.g. cigarette smoking and recreational drug use) (2).

Harmful use of alcohol is related to premature death and avoidable disease, and presents a major avoidable risk factor for neuropsychiatric disorders, cardiovascular diseases, cirrhosis of the liver and cancer. It is associated with several infectious diseases, such as HIV/AIDS and tuberculosis, and contributes significantly to unintentional and intentional injuries, including those due to road traffic accidents and suicide (3).

As levels of alcohol intake increase, so does the prevalence of a variety of risky behaviours, including unsafe sexual activity, behaviour leading to injury and damage of property, violence and illegal behaviour (4). An increased frequency of injury and assault inevitably leads to an increased strain on care and emergency services, as links between alcohol consumption and hospital admissions are well established.Spikes in heavy drinking among 18-24-year-olds are possibly a function of developmental processes occurring in this transitional period, sometimes called “emerging adulthood” (5). During this period of role instability, college attendance is only one of the major life options; young adults may also move away from home (without attending college), begin full-time jobs, take time off to “find themselves,” or join the armed forces (6).

There is little consistent information available regarding the pattern of alcohol consumption amongst Romanian student population (7, 8). The data drawn from the European School Survey Project on Alcohol and Other Drugs carried out in 2011 showed that the percentage of Romanian teenagers (15-16 years) who consumed alcohol during the last 30 days was lower than the European average intake in the case of the countries which participated in ESPAD project (an average of 49 versus 57) (9).

The aim of the current research was to describe drinking patterns of Romanian full-time undergraduate students and alcohol related behaviours.

2 THE METHOD

A cross-sectional study was performed during February-June 2013, the second semester of the academic year 2012/2013.

Students were selected randomly from two main universities in Romania, a university for medicine and a university for law, due to accessibility. The majority were from The Faculty of Medicine (67.3%), and 32.7% from the Faculty of Law. The distribution of participants by the year of study was fairly even: about one-third were in the first year of study, 36.5% in their third and another third in the last year of study (4th year). In order to participate in mandatory activities, in medical school students are divided into 4 groups in each academic year (there are six academic years). The groups (of about 80 students) are divided in six subgroups. Our study included 12 groups from the first year and 12 groups from the third year. All the subgroups present in the classes on the days of data collection were selected. From the law school we included in our study the whole number of the fourth year study, due to logistic accessibility. The selected student sample comprised of 521 students, from a total of 655 medical students and 160 law students. Pen and paper questionnaires were delivered to the students. Questionnaires were administered during mandatory activities (such as lectures, practical activities or exams) to encourage participation. Students were informed that the questionnaires were anonymous and confidential, and that participation was voluntary. All the students agreed to participate (except students who were absent for a legitimate reason). The response rate was 89.82%. During data collection the research team was present in the classrooms. The time required to complete the questionnaire was 25-35 minutes. Informed consent was given by the participants in the study.

2.1 The Instrument

Data were collected using a validated questionnaire which included the Student Alcohol Questionnaire (10). We had the questionnaire translated by two independent translators and, after that, back-translated into English in order to ensure the validity of the translation. Some questions were adapted to Romanian customs and regulations. It contained eight demographic items, six questions for determining quantity-frequency level, 19 statements or problems resulting from drinking. The reliability of the Romanian version of Student Alcohol Questionnaire is similar to the English version (11).

Calculations for this method are based upon the "rule of thumb": an average glass or a can of beer (50cl) is roughly equivalent to an average size glass of wine (15cl) or a shot of spirits (5cl); in terms of grams, this is approximately 10g of absolute alcohol, according to the European standard unit.

The instrument assessed the usual frequency and quantity of beer, wine and spirits, consumed by the student. The frequency response categories were assigned constant values, so as to make it possible to calculate units per week (every day =7.0, at least once a week but not every day = 3.5, at least once a month but less than once a week = 0.5, more than once a year but less than once a month = 0.12, once a year or less or not at all = 0). To compute the drinks of alcohol consumed on a weekly basis, a mean score was calculated by multiplying the quantity by the recoded frequency weight for each beverage type and summing up the three scores.

From the beverage (beer, wine or distilled spirits) most frequently used and the amount of beverage consumed on a typical occasion, a quantity-frequency level was calculated for each subject, who was then placed in one of three categories, namely: abstainers with no alcohol consumed in the last 12 months; light to moderate drinkers or low risk drinkers; and at risk drinkers or heavier drinkers. Different categories of drinkers were used for males and females. Male students who drank over 21 drinks per week and female students who drank over 14 drinks per week were considered at risk drinkers. In contrast, males who consumed 21or less and females who consumed 14 or less drinks per week during the previous 12 months were considered low risk drinkers.

Only students who had consumed any amount or type of alcohol in the previous 12 months (i.e. drinkers) were asked to report on behavioural problems associated with drinking. A mean score was calculated for each student by assigning one point for each of the 19 problems experienced at least once during the previous 12 months. We divided the reported problems as a result of drinking in six categories, namely: physical problems (hangover, nausea and vomiting), driving problems (driving after drinking, driving after excessive drinking, driving drunk, being stopped by the police for driving while intoxicated), academic problems (skipping a class after drinking, missing a class after drinking, coming to a class after drinking, receiving a lower grade because of drinking), problems with authorities (having trouble with the law because of drinking, having trouble with school administration because of drinking), violence problems (fighting with someone after drinking and damaging university property, setting of a false fire alarm because of drinking), others (being criticized by a date because of drinking, losing a job because of drinking, participating in a drinking game, forced someone or were forced to have sex, being aware of the drinking problem).

2.2 Data Analyses

For other calculations, such as the cross-tabulation of various demographic variables and drinking patterns, χ^2 analyses from the Statistical Package for the Social Sciences Program (SPSS 20) were used.

The χ^2 test was used to assess differences in data, Anova with post-hoc Games Howell test to assess the variation between categories. We considered statistically significant the results with $p<0.05$.

3 RESULTS

The sample of 468 undergraduate students consisted of 35.5% of males and 64.5% of females. The average age of the students was 21.9±3.22 years.

Students in the fourth year drank more than students in the first year or students in the third year. Males drank more than females ($p<0.001$).

Most of the students were living in rented apartments with other friends (students) (25.4%) or on university campuses (25.4%). About 60% of participants were unmarried and over one third (35.9%) were involved in relationships. Statistical analyses showed that there were no differences in alcohol consumption depending on the living situation (Table 1). On the other hand, marital status influenced the amount of alcohol intake. Religion appears to be a reason to decrease the alcohol intake.

Table 1. The alcohol intake depending on characteristics of the study group.

Variables	The number of respondents (percent)	Total g of absolute alcohol/week	t* or F**	p
Gender				
Male	166 (35.5)	118.30±126.84	t=2.78	<0.001
Female	302 (64.5)	84.11±112.77		
Age (mean±SD)	21.9±3.22 years			
Year of study				
1st	144 (30.8)	67.19±100.87	F=8.62	0.004
3rd	171(36.5)	88.70±126.67		
4th	153 (32.7)	92.73±110.94		
Living situation				
With parents	132 (28.2)	84.73±121.77	F=0.742	0.564
Rented apartment (alone)	72 (15.4)	118.16±132.54		
With other friends (rented apartment)	119 (25.4)	95.17±102.47		
University Campus (dormitories)	119 (25.4)	93.30±115.63		
Private university building	16 (3.4)	118.47±170.62		
***NR	10(2.2)			
Marital status				
unmarried	282 (60.2)	84.68±118.46	F=0.320	<0.001
in a relationship	168 (35.9)	79.51±99.10		
married	13 (2.8)	89.56±134.72		
divorced	5 (1.1)	126.10±271.90		
The importance of religion				
Important	178 (38.05)	65.68±90.68	t=0.178	<0.001
Not important	289 (61.75)	110.85±127.69		
***NR	1(0.2)			

*t test
** Anova
***non-respondents

We divided the study group into three subgroups: abstainers, low risk drinkers and at risk drinkers, as we have shown above, depending on the consumed amount of alcohol. The study reveals that 15.2% of students did not drink alcohol (18 males and 53 females) (Table 2). 69.9% of males and 66.2% of females drank within the low risk level of alcohol consumption (1-21units/week for males and 1-14 units/week for females). The findings showedhigh percentages of heavy drinking students (17.3%), composed especially of males (19.3%). There was no statistically significant difference in the participants in terms of heavy drinking by gender (χ^2=0.470, df=1, p>0.05).

Table 2. Categories of drinkersby gender.

Categories of drinkers	Total number (%)	Males number (%)	Females number (%)
Abstainers	71 (15.2)	18 (10.8)	53 (17.6)
Low risk drinkers	316 (67.5)	116 (69.9)	200 (66.2)
At risk drinkers	81 (17.3)	32 (19.3)	49 (16.2)

We calculated the amount of alcohol ingestion depending on the type of beverage and the percentage of absolute alcohol contained in it. Beer appears to be the most popular beverage and the beverage most likely to be consumed by heavy drinkers (Table3).

Table 3. Amounts of alcohol consumed, by the type of beverage and percentage of absolute alcohol contained in it.

Categories of drinkers	Low risk drinkers Males	Low risk drinkers Females	At risk drinkers Males	At risk drinkers Females
Grams of beer/ week (mean±SD)	34.71± 47.27	12.40± 13.99	179.97± 88.85	147.23± 96.41
Grams of wine/ week (mean±SD)	34.71± 47.24	12.72± 12.61	89.17± 80.15	99.32± 85.74
Grams of spirits/ week (mean±SD)	10.77± 14.79	9.64±1 6.74	45.26± 63.64	38.91± 58.72
Total Grams of alcohol/week (mean±SD)	64.19± 57.60	34.77± 27.08	314.44± 115.49	285.47± 105.503

Problems resulting from drinking. Most students who drink at risky levels reported physical problems (hangovers, nausea and vomiting). Other problems reported in higher score by heavy drinkers were academic problems, such as coming to a class after drinking and missing a class after drinking (Table 4). Certain types of problem behaviour, such as problems with violence (fighting) or the authorities, were reported without differences between the categories of drinkers (Table 4).

Table 4. Scoring reported problems resulting from drinking.

Problems	Low risk drinkers (mean±SD)	At risk drinkers (mean±SD)	t (t test)	p value
Physical problems	4.77± 2.35	6.44± 2.28	5.71	<0.001
Problems related to car driving	4.60± 2.07	4.75± 1.85	0.588	<0.05
Problems related to academic performance	5.07± 2.36	6.32± 2.65	4.133	<0.001
Problems with authorities	2.15± 0.83	2.09± 0.40	0.619	>0.05
Problems with violence	2.34± 1.20	2.44± 1.18	0.645	>0.05
Others	5.77± 2.21	6.43± 2.73	2.66	0.02

Table 5 shows a multivariate analysis between the categories of drinkers, divided by the quantity-frequency levels of alcohol intake, hours of individual study and grade point average. As the findings show, the number of hours of individual study is statistically significantly associated with the level of alcohol ingestion (F=3.242 and p=0.007). The present study shows that abstainers had the greatest numbers of study hours per week. Despite these differences in studying hours, grades obtained by students in the previous semester were not associated with quantities of alcohol drinking.

Table 5. Multivariate analyses between categories of drinkers and hours of individual study/week and grade point average in the previous semester.

Categories of drinkers	Hours of individual study/week*	Grade point average in the previous semester**
Abstainers	21.31±13.76	8.04±0.93
Low risk drinkers	18.95±13.09	8.43±6.17
At risk drinkers	15.77±10.32	7.80±1.08
Total	19.13±14.30	8.48±5.53

*Anova F=3.242, df=5, p=0.007
**Anova F=0.454, df=5, p=0.810

4 DISCUSSION

Binge drinking represents a rising problem in Europe, and the younger population is the most exposed category. The aim of this study was to estimate alcohol consumption among Romanian university students and to describe alcohol ingestion related behaviours. There is a lack of research regarding drinking amongst young adults attending university. The vast majority of these studies are based on the US and on Canadian samples. The data provided by WHO statistics showed that the average annual alcohol consumption for Romanian people over 15 years of age measured in pure alcohol was about 14.4 litres per capita per year in 2010 (including the unrecorded consumption). In Central and Eastern European countries, there was an overall increase in alcohol consumption per capita between the years 1990 and 2010 (13). Large population studies within the USA have suggested that students aged 17–23 years have much higher binge drinking rates than older students. Recent concerns have been focused on the practice of binge drinking, typically defined as consuming five or more drinks in a row for men, and four or more drinks in a row for women, in the past 30 days (14). A shorthand description of this type of heavy episode drinking is the 5/4 definition. It should be noted, however, that colleges vary widely in their binge drinking rates – from 1 percent to more than 70 percent –

and a study on one campus may not apply to others (15). In addition, hazardous drinking in men occurs with over 21 units of drinks consumed per week and in women with over 14 units of alcohol consumed per week. According to this definition, the findings of the present study show that 17.3% of the students were heavy drinkers, consuming about 300.58±100.91 grams of absolute alcohol per week. The results of our study reveal a great incidence of heavy drinking among women (16.2%) compared to men (19.2%). On the other hand, the results of our research are similar to other studies indicating that male students, in particular, tended to consume alcohol more often and in higher quantities (16-18).Other studies showed that this proportion of heavy drinking decreased significantly at the age of 24 with both genders (19). Wechsler suggested that women who drink are less willing to recognize their alcohol problem (20).

In terms of living arrangements, in our study, students who were living in rented apartments reported higher levels of alcohol consumption than students who were living with their families. Nevertheless, the results were not statistically significant. These findings are similar to the ones of other studies which revealed that factors influencing student drinking are: a substantial amount of unstructured time, living situation (e.g., at home with parents, on campus, off campus), university life. Other studies showed that rates of alcohol abuse and dependence are roughly equivalent for college and non-college individuals, and that the development of alcohol-use disorders among young adults is more related to their living situations (e.g., at home with parents, on campus, off campus) than to a college status itself (21-23). In our survey, 28.9% of the participants were living with their parents and the rest of them with college mates or alone (15%), supporting the data from previous studies which show that students who chose not to drink often do so because their parents had discussed alcohol use and its adverse consequences with them (24, 25).

Marital status and religion appear to influence the alcohol intake. The results are consistent with other studies which show that people involved in a relationship are less likely to consume large amounts of alcohol (26).

Analyses of drinking habits in our university population indicate that students in the fourth and third year drank more than students in the first year. Certainly, the pattern of changes in alcohol consumption over the academic years differs across different studies (27, 28).

Furthermore, this study provided the evidence of behavioural consequences associated with alcohol consumption. Consistent with findings from previous studies, our study shows that students who drank over low risks limits reported physical problems and were more likely to develop risky behaviours, like driving under the influence of alcohol (29).

However, violence or problems with authorities were poorly reported by drinking students, regardless of the findings of other studies (30). We should take into account that respondents who participated in this study were medical and law students. Medical and law school environments might influence students' behaviours after drinking (through both formal and informal or hidden curriculum).

On the other hand, the survey reveals the effects of excessive drinking on academic performance. The data of our study showed that at risk drinkers reported a significantly higher score of academics problems, such as missing school, coming to a class after drinking and cutting a class after drinking, including receiving a lower grade after drinking, suggesting that drinking problems interfere with academic performance and assignments. The results also showed that alcohol consumption had a negative effect on study hours and that the amount of alcohol consumed correlates in a negative way with the time spent on academic activities. Apparently heavy drinkers obtained the lowest semester grades compared with other categories of drinkers, but results are not statistically significant.

More research evidence is required before the question of whether or not alcohol consumption has a detrimental effect on academic performance can be answered (31). In addition, it is essential that the 'pattern' of consumption be considered. For example, binge drinking once a week on Friday might have very little detrimental effect on academic performance, but drinking 2–3 units regularly (yet still staying within 'sensible' weekly guidelines) at lunchtime before afternoon classes may not be without effect (32).

One of the limitations of this study is the self-administered questionnaire (33). As with all questionnaire surveys, it is difficult to assess the accuracy of the data. However, the questionnaire was completed by the students on voluntary, anonymous and confidential basis, which we think promotes a more reliable response. Restrictive (medical, legal) educational program concerning alcohol consumption itself among selected university students could have impact on the results. Another limitation of our study pertains to the assessment of the amount of alcohol intake. Romanian drinks could contain different amounts of pure absolute alcohol from the ones we considered in this study.

While behavioural consequences have been highlighted, the immediate physiological consequences of hazardous drinking may be less obvious, but just as important. Binge drinking is associated with adverse effects on blood homeostasis and cardiac rhythm, ischemic heart disease, white blood cell activity, female reproductive level and the fetus (1, 34).

Despite efforts, the magnitude of college student drinking and alcohol-related problems has not decreased significantly in the past 15 years (35). Taking into account the large number of heavy drinkers, the study highlights the need of alcohol drinking prevention among Romanian students. It is possible that heavy drinking is related to other risky behaviours, such as illicit drug experimentation and tobacco use – behaviours we did not discuss in this study.

The educational programs should increase student awareness of alcohol related problems, change attitudes and beliefs, and foster each student's determination to avoid high risk problems. The prevention should focus on student drinking on campus, and also cover off-campus behaviour (36), because the study showed that about 40% of students are living in rented apartments in the city. The educational programs should focus not only on individuals, but also on groups, institutions, communities and public policies (37, 38).

Legal measures should be adopted to limit alcohol sales on campuses or near them.

5 CONCLUSIONS

The study reveals that 15.2% of Romanian university students did not drink alcohol and about 17% were heavy drinkers (drinking five drinks more than once a week). The most frequent drinking problems and behaviours are also related to academic performance and had even occurred in the past, suggesting drinking experimentation at a younger age. Our findings reveal the need of public health and individual policies which would reduce drinking and alcohol-related consequences.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

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ETHICAL APPROVAL

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