



Episodic Alcohol Consumption by Youths

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Abstract

This paper presents evidence that even rare episodic alcohol consumption by young people is not harmless. Unsafe rare episodic alcohol consumption by youths (students) was reflected in the reduced attention concentration and lower academic buoyancy, compared to those who completely abstain from alcohol.

Key Words: Alcohol, youth, students, attention concentration, academic buoyancy

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Introduction

Alcohol is the most common psychoactive substance consumed by youth in the world [1-3]. In a report published by the Lancet, Nutt and colleagues asserted that the harm caused by alcohol to the physical and mental health of a person, who consume it, as well as the people around him (family, friends and others) and society significantly exceeds the harm from other psychoactive substances [4].

Alcohol affects the social, psychological, medical, economic, confessional spheres of human life [5,6]. Alcohol is considered an etiological factor for more than 60 diseases [1]. The most common problems associated with alcohol use among young people are social and legal. In addition, in the students' population alcohol use leads to poor academic performance [1,7,8]. Manifestation of the problems stated above may be dependent on several factors such as biological (genetic vulnerability, gender and physiological characteristics) social (alcoholic traditions, social control, the availability of alcohol), psychological, type of alcoholic beverage, alcohol dose, pattern and frequency of consumption [1]. The World Health Organization in 2004 [9] estimated that, "... 2.5 million people died from alcohol related causes in the world. Out of this, 320,000 were young people aged 15 - 29 years". In this regard, it is imperative to monitor the prevalence of current alcohol use by young adults to raise awareness of the harm caused by drinking to the vulnerable groups [9]. Since students are especially vulnerable to alcohol use due to the increased requirements of intellectual (academic) performance which is useful to successful completion of education – a gateway to successful life and profession. Therefore, undoubtedly, it is imperative to conduct routine analysis of the rate of alcohol use and related harm among students. Besides, the results obtained are inevitably crucial in anti-alcohol campaign [1].

Due to the significant influence of alcohol on the social sphere, the World Health Organization formed a global strategy to reduce alcohol consumption [9]. A similar strategy has been established in many countries [1,10,11]. In Belarus, there is a national program of action to prevent and combat alcohol abuse and alcoholism [State program for national action to prevent and combat alcohol abuse and alcoholism during the period 2011-2015 years]. This program [12] aims at the prevention of alcoholism and alcohol abuse among young people and women. This is because the highest prevalence of alcohol use is in this age group of the population and the increase of alcohol-related problems in the female population [1,13]. In the

context of carrying out this strategy, the safe level of alcohol consumption by a young person remains an open question. According to some researchers, the traditional safe level of alcohol consumption requires correction in the direction of its significant reduction [14,15].

The aim of this study was to identify the prevalence of alcohol use among students and to analyze the consequences of alcohol consumption (per session and monthly doses) on the mental health and academic achievement of the respondents compared to the abstainers (non-alcohol users).

Materials and Methods

Study population/ participants

The study was conducted among student of the Belarusian State Medical University, Minsk, Bela-rus. Minsk is the most populated city in Belarus with majority of students studying here, the Bela-russian State Medical University was selected due to my in-depth knowledge of the university timetable schedule. This made it easier to get a substantial number of participants for the study. A total of 379 students of 3 - 6 courses were approached and explained the study aims and objectives. Of these, 95 students refused to participate. The questionnaires of 19 respondents who scored on the test "Sincerity" 50 percent or less were excluded from further processing. Statistical data were analyzed for 265 questionnaires.

Procedure

The Ethics and Research Committee of the university approved the study protocol. In the study, 5 to 15 students participated simultaneously. For 1.5 hours, respondents filled different questionnaires: "General", "Sincerity", " Michigan Alcohol Screening Test (MAST)", "the Cut, Annoyed, Guilty and Eye-opener questionnaire (CAGE)", " the Alcohol Use Disorders Identification Test (AUDIT)" and others. For additional 5 minutes, each student performed a test for analysis of attention. The study was anonymous.

Questionnaires

The questionnaire "General" contained 53 questions to obtain general information about the participants (gender, age, physical activity, work and rest, schedule and duration of sleep, food regime, bad habits, religion). There was no column for "Name", and "Number of

academic group" in the questionnaire. In the questionnaire "General", there was a built-in "Sincerity" test which contained 10 questions of the scale "Lie Detector" from "Level of neuroticism-psychopatization" [16]. Results of the questionnaires were analyzed if the number of truthful (sincere) answers was not less than six (i.e. 60 - 100%).

The AUDIT, CAGE and MAST tests are widely used and recommended by World Health Organization [17,18] to identify initial symptoms of alcohol problems and alcohol dependence. These screening tests are recommended for use in narcological and general practice in the Republic of Belarus [1, 19] and elsewhere [1,17,18,20]. The reported ethanol dose was calculated based on recognized quantity of alcohol (stated in the answer to question 2 on the AUDIT test). Calculation of the actual dose of ethanol was based on the reported quantity. The reported quantity was multiplied by a factor of 1.25 for beer, 1.95 for wine, 2.0 for vodka and other strong strength alcoholic drinks [21]. Alcohol users as identified on the AUDIT were further divided into two groups: the moderate "non-problem" drinkers and problem drinkers. The moderate drinkers scored 1-7 points on the AUDIT, whereas the problem drinkers scored 8 and above.

Assessment of the functional state of the participants and the degree of fatigue was carried out on the results of the psychometric tests "WAM" (Well-being, activity, mood) and its brief-version "WAM-8" according to accepted recommendations [22,23]. Neuropsychological adaptation, including state and trait anxiety were assessed by Gurvich (1992) [24]. Assessment of the function of attention and mental capacity of students was conducted according to the "correction test" using the letter table "Anfimov tables" [25].

The questionnaire on "academic achievement" contains information about all of the scores for all written examinations and differentiated tests (including resits). Based on the data, two important indicators of educational activity of the students were calculated: Grade Point Average (GPA) and effectiveness to sit for examinations for the first time.

Data analysis

Statistical data processing was performed using Excell 2007 and standard statistical package SPSS (Statistical Package for the Social Science) 16.0 for Windows; parametric and nonparametric methods [26]. All volumes of alcohol are given in values of absolute ethanol.

Results

The results of the screening tests are presented in table 1. Overall, 81.5% of the students were alcohol users. A total of 17% reported problem drinking. The quantity of alcohol consumption was significantly higher among the problem drinkers, compared to the moderate or "non-problem" drinkers (Table 1).

Table 1. Screening test results of the students

Gender	Groups	AUDIT, average score, M±m	Alcohol use, M±m		Percentage, %		
			reported ml/month	actual ml/month	Abstainers	Alcohol users	Problem drinkers on the AUDIT
M n=107	Mo (n=44)	4.1±0.3*	117 ± 21*	193 ± 49 *	30.8 (n = 33)	69.2 ▼ (n=74)	28.0 (n = 30)
	P (n=30)	14.2±1.4	500 ± 91	861 ± 195			
	All (n=74)	8.2±0.8					
F n=158	Mo(n=127)	2.7±0.1*☼	52 ± 4 *☼	96 ± 7 *☼	10.1 ☼ (n = 16)	89.9 ☼▼ (n=142)	9.5☼ (n=15)
	P (n=15)	10.4±0.8☼	238 ± 58☼	353 ± 75 ☼			
	All (n=142)	3.5±0.3☼					
M+F n=265	Mo(n=171)	3.0±0.1*	69 ± 6*	125 ± 12 *	18.5 (n = 49)	81.5 ▼ (n=216)	17.0 (n=45)
	P (n=45)	12.9±1.0	402 ± 64	677 ± 136			
	All (n=216)	5.1±0.3					

Notes: n – the number of respondents in the group, F – female, M – males. Mo – moderate alcohol users with alcohol consumption frequency of 1 - 3 times per month and a per session dose of 49 ml (for males) and 27 ml (for females) in terms of absolute ethanol, P – problem alcohol users are students with reported alcohol consumption frequency from 3 times per week up to 4 times per month and a per session dose of 81 ml (for males) and 51 ml (for females), All – all alcohol users of the corresponding sex (only M, only F or M + F). ☼ – significance of differences of the parameters compared with those for the males of the same group (Mo, P or All), $p < 0.05$. * – significance of differences of the parameters compared with those for the problem drinkers for both the males and females (from the respective problem group, № 1), $p < 0.05$. ▼ – significance of differences of the parameters compared with indicators of abstainers of the same sex (M, F, M + F), $p < 0.05$.

The GPA of alcohol users, irrespective of their gender and the quantity of reported alcohol, starting from the 2nd to the 9th semester, was lower, compared to the non-drinkers (Figure 1). Among moderate drinkers, reduction in the GPA relative to the non-drinkers was 0.4 - 1.1 points, whereas for the problem drinkers, it was 0.9-2.2 points (Figure 1 and Table 2). Similar significant differences are identified between the GPA of problem drinkers and moderate drinkers, precisely, female group and the general group of the males and females during the 1st - 6th and 9th semesters, and the group of males during the 4th semester. GPA of moderate drinkers on the results of semester examinations was 0.6 - 1.5 points higher than their peers

who drink a lot (Figure 1 and Table 2). Established facts show – time, and dose-dependent negative effect of ethanol on the academic performance and mental functions of both males and females.

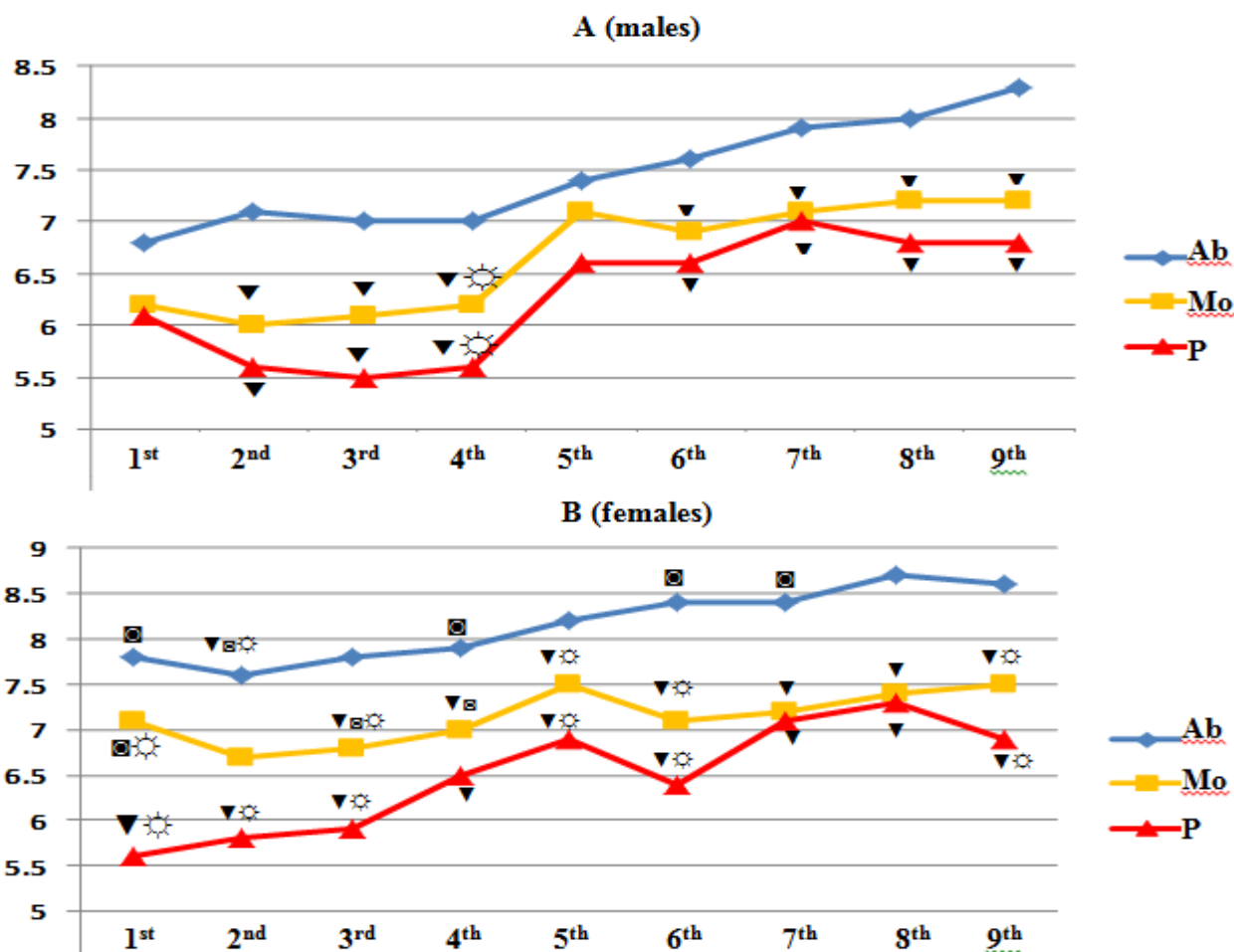


Figure 1. Dynamics of the GPA of students with different attitudes to alcohol.

Notes: n – the number of respondents in the group. F (n = 158) – females, M (n = 107) – male. Groups of students : Ab – abstainers (M, n = 33; F, n = 16) Mo - moderate drinkers (M, n = 44; F, n = 127), alcohol (M – 49 ml / per session, F – 27 ml / per session at 1 - 3 times a month; AUDIT score among the M – 4.1 ± 0.3 , among the F – 2.7 ± 0.1); P - problem drinkers (M, n = 30; F, n = 15), alcohol (M – 81 ml / per session, F – 51 ml / per session with a frequency of three times per week and up to four times per month; AUDIT score among the M – 14.2 ± 1.4 , F – 10.4 ± 0.8). Significance between different groups of indicators based on criteria of Student "t" test and Pearson χ^2 ▼ – differences are significant ($p < 0.02$) in comparison with those of abstainers (M, F); ☼ – differences are significant ($p < 0.05$) between the indicators of problem drinkers (P) and moderate drinkers (Mo) in the group of males and females; ■ – differences are significant between females and males of the same group (Ab, Mo or P).

Table 2. Comparative characteristics of the pattern of alcohol consumption by students of different sexes and analysis of their academic performance of abstainers

Gender	Groups	Alcohol users that reported TOPA, %	Quantity of alcohol use per student		↓GPA in alcohol users in relation to abstainers, points, min–max	RRRE Abstainers: Alcohol users
			M±m	Frequency of alcohol use in relation to the abstainers		
M n=107	Mo (n=44)	59.1(n=26)	2.36±0.50	3.11▼	-0.7 – -1.1▼	1 : 2.27▼*
	P (n=30)	73.3 (n=22)	3.83±0.98	5.04▼	-0.9 – -1.5▼	1 : 4.16▼
	All (n=74)	64.9 (n=48)	2.96±0.50	3.89▼	-0.8 – -1.3▼	1 : 2.94▼
F n=158	Mo(n=127)	50.4*(n=64)	1.28±0.23 [☆]	6.73▼	-0.7 – -1.3▼*	1:6.91▼ ^{☆*}
	P (n=15)	100.0 [☆] n=15	2.40±0.79	12.63▼	-1.3 – -2.2▼	1:12.94▼ [☆]
	All (n=142)	55.6 (n=79)	1.40±0.22 [☆]	7.37▼	-0.7 – -1.4▼	1 : 7.54▼ [☆]
M+F n=265	Mo(n=171)	52.6*(n=90)	1.56±0.22*	2.74▼	-0.4 – -1.0▼*	1 : 2.31▼*
	P (n=45)	82.2 (n=37)	3.36±0.71	5.89▼	-0.9 – -1.7▼	1 : 5.16▼
	All (n=216)	58.8 (n=127)	1.88±0.19	3.30▼	-0.4 – -1.1▼	1 : 2.86▼

Notes: All abbreviations in Table 2 are the same as in Table 1. TOPA – intoxication-oriented pattern of alcohol consumption, that is, more than 5 drinks for males and 4 or more doses for the females during a session of drinking for approximately 2 hours. GPA↓ – decrease in the GPA from the 2nd to the 9th semesters. RRRE – relative risk of resit examinations.

Respondents who consume alcoholic beverages in moderate doses (the so-called "non-problem" consumption) were 2.74 times more likely to have resit examinations per each alcohol user (1.56 ± 0.22) compared with the abstainers (0.57 ± 0.15). The estimated relative risk of resit examinations among the moderate drinkers was 2.31 times higher than in non-drinkers.

Regression analysis showed unilateral negative effect of ethanol on the academic performance of students of both sexes: $GPA = 7.079 + (-0.007) \cdot X$, where X – reported per session dose of absolute ethanol (ml). Negative regression coefficient (-0.007 points / ml of ethanol, $p=0.019$) allows for an objective prognosis of the decline in the GPA of students who consume alcoholic beverages with regard to the quantity and strength, relative to the same indicators of the abstainers. The pattern of alcohol use is very important, since the majority of students of both sexes reported intoxication-oriented pattern of alcohol use – as noted in 58.8% cases ($p<0.001$) (Table 2).

Regression analysis between GPA and the scores on the AUDIT scale (at the level of non-problem drinking "score 1–7"), showed significant negative linear relationship. Already with a score of 1 on the AUDIT, the relationship was highly significant. $GPA = 7.043 + (-0.065) \cdot B$ (AUDIT score, $B=1$), where $p < 0.001$ for the value "7.043" and $p < 0.001$ for the value "-0.065". Regression coefficients at AUDIT score of 1 to 7 were highly reliable, and their values ranged from -0.031 ($p=0.002$) to -0.086 ($p<0.001$), making for the entire sample of students of moderate drinkers—0.070 ($p<0.001$). The calculated decrease in GPA (by regression analysis) of students who scored 1-7 points on the AUDIT scale, ranged from 1.84 % ($p<0.001$) to 9.18% ($p<0.001$) relative to that of the non-drinkers.

The calculated linear regression dependency of the GPA of all 265 respondents on their AUDIT test scores showed that the formula could be displayed thus: $GPA = 7.133 + (-0.065) \times B$, where B – score obtained on the AUDIT; $p < 0.001$ for the regression coefficient (-0.065), $p < 0.001$ for the value 7.133. For the females, this regression dependency was even more pronounced: $GPA = 7.615 + (-0.086) \times B$; note a higher regression coefficient for them "-0.086" ($p = 0.002$). Hence, it follows that a student with a score of even 1 on the AUDIT scale should be considered as having alcohol problems.

The relevance of this approach emphasizes the further analysis of frequency of resit examinations by students who had on the AUDIT scale, less than 8 points, and the calculated relative risk (Table 2) of obtaining unsatisfactory score in examinations. This risk for the general group of students who scored 1, 5 and 6 points on AUDIT was 1.80-fold ($p < 0.02$; $\chi^2 = 6.087$), 2.13-fold ($p < 0.02$; $\chi^2 = 6.621$) and 2.17-fold ($p < 0.05$; $\chi^2 = 5.850$) higher than that of the non-drinkers. The share of female students who successfully completed the semester examinations, and scored 1, 2 and 5 points on the AUDIT, and students who had 1, 4 and 6 points, was less by 7.9%-26.9% ($p < 0.05$), compared to the non-drinkers of the corresponding gender.

Discussion

The present study shows a high prevalence of alcohol use among students of the university. Alcohol use (even rare, episodic, in moderate doses) by university students was linked to a high rate of negative effect on their intellectual activities.

A substantial number of the respondents in the study rarely, episodically consume alcohol and in moderate doses. Numerous studies conducted by our team [1,7] and other researchers [8,13,27-29] have shown that majority of students consume alcohol occasionally (~1-4 times/month) in moderate doses. In spite of the small doses and episodicity of alcohol consumption by the majority of students, the related problems are very significant. They are manifested as increased risk [1] of physical harm (injury, accident) and mental health and lower academic performance.

In the present study, although higher reported doses of alcohol resulted in greater reduction in academic performance, decrease in academic performance was recorded for all alcohol users, independent of their gender, and quantity, frequency of alcohol use. Decrease in academic performance among students, who rarely consume alcohol, according Adewuya (2005) requires a review of the cut-off points of the AUDIT scale towards its reduction from 8 to 4 points [14]. Scientific data of researchers at the Harvard School of Public Health, Harvard University, point to the necessity of revising the threshold for safe alcohol consumption by students (in the direction of its significant reduction), as the effects of alcohol are greater than previously thought [15]. For young people, basis for determining non-problem alcohol consumption, in our opinion, should be based on the relationship between academic performance and test scores on the AUDIT.

Significant decrease in GPA (Figure 1 and Table 2) and increase in the number of re-examinations (Table 2) by students, who moderately consumed alcohol, compared with abstainers indicates the absence of safe exogenous ethanol dose for young adults (students), whether in the form of weak (beer), medium (wine) or strong (vodka) alcoholic beverages. This study identified a time-, dose-dependent nature of the adverse effects of alcohol on students' performance and the higher risk of alcohol consumption for females. Moreover, for moderate female drinkers, the number of re-examination was 6.73-fold ($p < 0.001$) higher and the risk of obtaining unsatisfactory score in an examination was 6.91-fold ($p < 0.001$) higher than among the abstainers. These values were significantly higher than analogical parameters in the group of male drinkers (3.11-fold; $p < 0.01$) and 2.27-fold respectively) relative to the non-drinkers (Table 2).

The data obtained suggest that the basis for calculating the risks of alcohol consumption with harmful consequences should be based not only on clinically relevant factors (injuries, etc.), but also the efficiency of students' learning activities. With this approach, even a score of 1 on the AUDIT, may indicate the presence of a high risk of alcohol-related problem such as decrease in the effectiveness of learning. The findings also emphasize the need to create a control group of abstainers in the study of the problems of alcoholism and/or the effects of acute or chronic alcohol intoxication and the ineligibility of the term "non-problematic" alcohol consumption (at least for students-youths).

There are different theories to explain the decrease in academic performance of students who consume alcohol: reduction in the time of preparation to lessons and homework or absence from classroom [1, 13, 27], lack of experience in alcohol consumption [30] and others. At the same time, there is the idea that reduction in academic achievement is the factor that results to alcohol consumption. Indeed academic performance is affected by many factors, including stress. However, our study (Figure 1) showed that 1st semester academic performance of students who began to drink alcohol occasionally at the university was not different from the results of the non-drinkers.

Worth noting are the widely used terms in the literature (at the international and republican levels), "non-problem" (clinically insignificant) or "moderate" alcohol use and the corresponding group of young people "non-problem or moderate alcohol users", which are sometimes used in research as control groups [31]. As a criterion for the formation of such groups, respondents must have scored 1 to 7 on the AUDIT [1,17].

Indeed, the reported average single dose of alcohol by the students (males) of the problem group, who scored 8 or more points (81 ml) on the AUDIT scale, was significantly higher than the single dose in the males of the non-problem group who scored less than 8 points (49 mL) on the AUDIT scale ($p < 0.01$). Their average monthly dose was higher for problem drinkers than for moderate drinkers by 4.3 times (Table 1). However, a detailed study of the effects of rare, episodic consumption of alcohol in small to moderate doses showed that the terms "non-problem and moderate" do not mean the absence of alcohol-related problems. This applies, above all, to indicators such as academic performance of students (Figure 1 and Table

2) [1,8,27]; the state of their mental functions and mechanisms for maintaining blood glucose levels [1].

Conclusions

1. The share of students of both sexes who consume alcohol was 4.41 times ($p < 0.001$) more than that of the non-drinkers. The majority of students who consume alcohol reported intoxication-oriented pattern of consumption (58.8%; $p < 0.001$) and they had significant deterioration of academic performance compared to the non-drinkers. Respondents who consume alcohol (even in rare, moderate doses) that scored only 1 - 7 on the AUDIT scale had lower academic achievement and a high frequency for resit examination compared to the non-drinkers.
2. There were significant gender differences in alcohol use by students: higher prevalence (20.7%) among female students; the share of problem respondents was 2.95 times ($\chi^2 = 15.56$; $p < 0.001$) higher than among males; the reported and actual doses of alcohol (1.78 - 2.44 times lower among the females, compared to the males) and the risk of examination resits (lower in male episodic drinkers compared with female alcohol users).
3. Reduction in the GPA, as well as increase in the number of resit examinations and reduction of the proportion of students who successfully passed the semester examinations, who episodically (in small-moderate doses) consume alcohol and scored 1-7 points on the AUDIT scale, indicate that even small to moderate quantity of exogenous ethanol is unsafe. This gives reason to believe that a single and monthly relatively safe exogenous dose of alcohol in the form of alcoholic beverage (beer, wine, vodka etc.) for young people (especially students) does not exist. Therefore, even a score of 1 on the AUDIT scale should be considered as the presence of alcohol problems for a young person-student.

Recommendations

The results of this study indicate that there is need to conduct a holistic analysis of the effects of alcohol use on the cognitive and academic indices of students. There is need to extend the study to other institutions in the nation. This study provides the basis of conducting a detailed laboratory analysis of the long-term effect of alcohol consumption (at various doses), in a

condition of pro-longed mental functioning and examine how cognitive functions changes over time while control-ling for other factors.

Conflict of Interest

The author declare no conflicts of interest.

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