Evidence of association between early alcohol use and risk of later problems

Evidência de associação entre uso precoce de álcool e risco de problemas futuros

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Abstract

Objective: *To investigate the relationship between age of onset, alcohol consumption patterns and related problems.* ***Method:*** *In 2004, one self-administered questionnaire was completed by 1,990 students from the 5th to 11th grades of schools in Paulínia-SP. Data collection was conducted at the classroom without the presence of the teacher. The participation in the study was voluntary and anonymous.* ***Results:*** *Prevalence of lifetime alcohol use was 62.2%. The mean age of first use of alcohol was 12.35 (sd = 2.72) and ranged between 5 and 19 years of age. In 78% of the cases, the first use occurred before the age of 15, and more than 22% of the students reported having tried alcohol before 10 years of age. There were significant differences regarding current pattern of use: those who started earlier consumed more drinks per occasion (p = 0.013) and had more drunkenness episodes in the last 30 days (p = 0.05). A relationship between the age of first alcohol use and the use of tobacco (p = 0.017) and other drugs (p = 0.047) was observed.* ***Conclusions:*** *Adolescents first use alcohol in early ages, what impacts the current consumption patterns. This study emphasizes the need of actions regarding public alcohol policies in Brazil in order to prevent or delay the initiation of alcohol use and its related problems.*

Descriptors: *Adolescent; Age of onset; Alcoholic beverages; Alcohol drinking/adverse effects; Public policy*

Resumo

Objetivo: *Investigar a relação entre idade de início de uso de álcool, padrão de consumo e problemas relacionados.* ***Método:*** *Em 2004, um questionário de autopreenchimento foi respondido por 1.990 alunos de 5ª série do ensino fundamental a 3ª série do ensino médio do município de Paulínia-SP. A coleta de dados foi realizada em sala de aula, sem a presença do professor. A participação no estudo era voluntária e anônima.* ***Resultados:*** *A prevalência de uso de álcool na vida foi de 62,2%. A média de idade de primeiro uso de álcool foi de 12,35 (sd = 2,72), variando entre 5 e 19 anos. Em 78% dos casos, o primeiro uso de álcool ocorreu antes dos 15 anos, sendo que mais de 22% dos adolescentes relataram que experimentaram bebida alcoólica antes dos 10 anos. Houve diferenças significantes para padrão de consumo atual: aqueles que começaram mais cedo consumiram mais doses por ocasião (p = 0,013) e tiveram mais episódios de embriaguez nos últimos 30 dias (p = 0,05). Houve associação entre a idade de experimentação do álcool e o uso de tabaco (p = 0,017) e outras drogas (p = 0,047).* ***Conclusões:*** *Jovens experimentam álcool em idade precoce e isto tem impacto no padrão de consumo atual. Esse artigo enfatiza a necessidade de ações imediatas em relação às políticas públicas do álcool no Brasil para prevenir ou adiar o início do consumo de álcool e problemas relacionados.*

Descritores: *Adolescentes; Idade de início; Bebidas alcoólicas; Consumo de bebidas alcoólicas/efeitos adversos; Política social*

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Introduction

Alcohol use among adolescents has increased in the last decades.[1] The habit of drinking has become part of the Western young culture, the exception being the total abstinence within adolescence.[2] National and foreign surveys point out that at the end of high-school nearly 60 to 90% of adolescents have consumed some kind of alcoholic beverage, being drunkenness and binge drinking present in the month previous to the study among 20 to 50% of cases.[3-7] Alcohol consumption among youngsters is related to several acute complications such as increase in the risk of injuries, violence, drunk driving, and unprotected sex.[1]

In adulthood, alcohol consumption decreases,[8,9] due to the adaptation to the social, cultural, and economic expectations and obligations linked to this new phase of life. However, a significant proportion of users (20 to 40%) evolve to complications related to its use, being dependence one of them.[10]

Starting the use of alcohol from pre-adolescence up to the first phase of adolescence stands among the risk factors associated with the appearance of such complications in adulthood.[10-12] Besides, there is an increasing consensus that early alcohol consumption, especially heavy use, is associated with cognitive impairment (memory, attention, planning) in adulthood, due to the neurotoxic action of alcohol on the developing brain structures of adolescents.[13] The same behavior is also associated with the higher risk of non-intentional injuries,[14] fights,[15] car accidents[16] and higher incidence of tobacco consumption among adolescents.[17]

The period of highest incidence of alcohol first use seems to be in the age range between 14 and 15 years.[18] Several studies point out that alcohol consumption in this age range is a higher risk for future complications, which decreases after the age of 16. In this sense, DeWit et al. performed a survival analysis with 5,856 subjects in the community, with antecedents of lifetime alcohol use, randomly selected during the Ontario Mental Health Supplement (1990-1991), and noticed a dependence rate of nearly 14% among subjects who started the use of alcohol before the age of 14 and of only 2% for those who had their first episode of use after the age of 19.[10] The risk of abuse was equally discrepant: nearly 13% and less than 3%, respectively.[10] Grant et al. accomplished a study with 5,792 subjects in the community, randomly selected by the National Longitudinal Survey of Labor Market Experience in Youth (NLSY), in the US, and found that the probability of alcohol dependence decreased between 5 and 9% for each year in which first alcohol use was delayed.[11] Wells et al., on the other hand, followed-up for 25 years one cohort with 1,265 newborns in New Zealand, assessing them yearly up to the age of 16 and afterwards at the ages of 18, 21 and 25. Analyzing the beginning of consumption in their sample at the age of 16, the authors did not find relationship between age (16 years) and risk of dependence, suggesting that such relationship occurs in earlier ages.[19]

Despite the increase in the comprehensiveness and in the number of studies on alcohol consumption in Brazil, there are no studies that consider the impact of age of onset and the risk of future problems. Based on this fact, this study aimed at delineating a profile of students in the city of Paulínia-SP, taking into account: age of onset, consumption pattern of alcoholic beverages and related problems. This study is part of a community trial, pioneer in Brazil, for the reduction of alcohol-related problems in the city of Paulínia-SP and the results obtained should be used to guide public policies on alcohol in the city. This is the first time that a representative sample of the student population of a Brazilian city is used for this purpose.

Method

1. Subjects

The sampling process was accomplished based on the lists of enrolled students, which were provided by schools. Of the 2,387 students allotted from the 78 classrooms, 2,074 were present in the classroom at the moment of the study and filled in the questionnaire. For data analysis, blank questionnaires were excluded as well as those in which students answered positively to the use of fictitious drugs, giving an answer rate of 87%. The final population studied included 1,990 students, aging 11 to 21 years (M = 14.9, sd = 2.28); of these, 88% aged under 18 years and 54.5% were females. Grades were grouped as follows: 28.9% studied at the 5th and 6th grades; 23% attended the 7th and 8th grades and 48.01% were enrolled in the 9th up to 11th grades. The population studied is predominantly catholic (59.9%), does not work (76.2%), lives with their parents (71.1%), and 50.3% are middle class (C), 26.2% belonged to the upper class (A/B) and 23.5% to the lower class (D/E).

2. Proceedings

This is a cross-sectional epidemiological study with a random sample of students from the 5th up to the 11th grade, at public and private schools in Paulínia-SP, from morning, afternoon and evening periods. The sample selection was probabilistic and had a 97.5% confidence level. A stratified sampling planning was considered and the distribution was proportional to the strata sizes.

Data collection was accomplished from October to November 2004. All students of the selected classrooms who were present at the collection moment comprised this sample. The participation was voluntary and anonymous. Students answered individually to a self-administered questionnaire, applied by two trained professionals per classroom and without the presence of the teacher. One question with the name of fictitious drugs was inserted in the questionnaire in order to verify inconsistencies and the lack of attention to answer the survey. The application sessions lasted from 20 minutes up to 1 hour and 30 minutes depending on the students' grade; the data collection in most of the classrooms was concluded in less than 60 minutes. Formal consent was signed by the school's principal.

3. Instruments

The questionnaire developed for this study was based on the instrument used by the Prevention Research Center – Pacific Institute for Research and Evaluation (PRC/PIRE) – in studies with youngsters[20] and we added sets of questions from the GSHS – Global School-based Student Health Survey – developed by the WHO in collaboration with the UNICEF, UNESCO and UNAIDS with technical and scientific counseling from the Center for Disease Control and Prevention (CDC),[21] and from the questionnaire of the Brazilian Information Center on Psychotropic Drugs (CEBRID), which is used in surveys with students.[4]

4. Data analysis

We used the Statistical Package for the Social Sciences (SPSS), version Windows 13.0, as the database and statistical analysis instrument. We performed a descriptive analysis of

the data in order to analyze the socio-demographic profile of the sample studied, as well as the behavior and consequences of alcohol consumption variables, and we obtained simple frequencies for categorical variables (gender, social class, religion, etc.) and summary measures (mean, median, standard deviation) for numeric variables (age, age of onset, etc.). In order to verify the association between two categorical variables, we used the chi-square test (X^2).

We used the Student's t test to compare two groups and the Analysis of Variance (ANOVA) to compare more than two groups. The comparisons between means were performed with homoscedasticity* tests. In case homoscedasticity was not met, the degrees of freedom of the tests were dully corrected. Multiple Comparison Tests (Duncan, in case of homoscedasticity and Dunett C, otherwise) were accomplished after we detected inter-group differences. These comparisons aim at verifying which groups had statistically different means. In order to analyze the age of onset of tobacco use, we used the linear regression, using the age of first alcohol use as the dependent variable. For all tests, we adopted a significance level of 5%.

5. Ethics Committee

This study was approved by the Research Ethics Committee of the São Paulo Hospital/Universidade Federal de São Paulo (Project no. 0259/06).

Results

1. Lifetime prevalence of alcohol use and age of onset

Of the 1,990 students, 1,230 (62.2%) had already consumed alcohol in lifetime. The mean age of the first use was 12.35 years (sd = 2.72), ranging between 5 and 19 years, being of 14 years or less for 78% of the sample and under 18 years in 99.1% of the cases. There was significant difference regarding age of first use between genders. Table 1 shows the frequencies of age of first alcohol use by categories and gender. Table 2 shows the frequencies of the mean age of first alcohol use among students by their current ages.

2. Alcohol use and drunkenness in lifetime and in the previous 12 months

Comparing the frequencies of alcohol use in the previous 12 months, students who had drunk at least once per week in the previous year, were younger at their first use (M = 11.97), whereas the mean age of first use for respondents with consumption frequency of up to three times a month in the same period was 12.44 years ($F_{1,1169} = 5.21$; p = 0.023). There were no differences between ages of first use for drunkenness in lifetime or in the previous 12 months.

Table 1 - Frequencies of age of first alcohol use by categories and gender

Age of first use in categories	Gender				Total	
	M		F		T	
	n	%	n	%	n	%
≤ 10	132	25.0	129	20.1	261	22.3
11-12 years	132	25.0	163	25.3	295	25.2
13-14 years	138	26.1	219	34.1	357	30.5
≥ 15	126	23.9	132	20.5	258	22.0
Total	528	100.0	643	100.0	1,171	100.0

M = male F = female T = total
X^2 = 0.014

3. Consumption patterns in the previous 30 days

Table 3 displays data related to the consumption patterns in the previous 30 days among adolescents (alcohol use, drunkenness and binge drinking episodes), by age of first use and gender.

4. Drunkenness

Data show that the lower the age of first use, the higher the frequency of drunkenness in the previous 30 days. Mean age of first use in students who reported drunkenness in 12 days or more in the previous month was 9.2 years, whereas those who did not report drunkenness used alcohol, in average, at the age of 12.41 years ($F_{3,1143} = 2.554$; p-value = 0.05).

5. Binge drinking in the previous 30 days

There were no significant differences regarding the frequency of binge drinking in the previous 30 days when mean ages of first use were compared. However, there was significant difference as to the amount of doses by episode in the previous 30 days; students who reported that they commonly drank 5 or more doses (binge drinkers) tried alcohol in an earlier age (M = 11.83) than those who consumed 4 doses or less by episode (M = 12.44) – $F_{1,1139} = 6.141$; p-value = 0.013.

Similar results are found when assessing the number of doses per episode for each type of beverage. Adolescents who commonly drank 5 or more doses of wine in the previous 30 days (M = 10.56; $F_{3,969} = 6.080$; $p < 0.001$) started earlier when compared to those who drank 1 dose per episode. Regarding beer, those who commonly drank 5 or more doses (M = 10.56), compared to those who drank up to 2 doses per episode (M =12.41), ($F_{3,969} = 6.256$; p-value < 0.001). As to alcopops, those who drank 5 or more doses on the same occasion had lower mean age of alcohol first use than those who drank up to 2 doses per episode in the last month, M = 11.61 and M = 12.92, respectively ($F_{3,915} = 2.759$; p-value = 0.041).

In relation to the preferred type of beverage that is, the one they most frequently drink, students who reported drinking more frequently distilled beverages had lower age of onset than those who preferred alcopops (M = 12.07 and M = 12.97; $F_{4,1133} = 2.618$; p-value = 0.034).

6. Context of drinking

Students who normally drink with family members tried alcohol before those who drink with their friends, M = 11.68 and M = 12.73, respectively ($F_{3,1142} = 13.789$; p-value < 0.001).

Regarding the way in which they acquired alcoholic beverages in the last consumption occasion, adolescents who got them at home or from family members had lower mean age than those who bought them, M = 11.62 and M =12.89, respectively ($F_{3,1145} = 13.468$; p-value < 0.001).

* Homoscedasticity is the assumption of equality of variance, an important aspect to be observed for the comparison of means, as its violation can lead to incorrect conclusions.

Table 2 - Frequencies of mean age of first alcohol use among students, by current age

Current age	n	Mean age of first alcohol use	Standard deviation	Standard error	95% confidence interval for mean		Min	Max
					Lower limit	Upper limit		
11	38	8.6053	1.93879	.31451	7.9680	9.2425	5	11
12	68	10.1176	1.48152	.17966	9.7590	10.4763	6	12
13	123	10.6992	2.07615	.18720	10.3286	11.0698	5	13
14	124	11.2903	2.13669	.19188	10.9105	11.6701	5	15
15	166	12.0663	2.18573	.16965	11.7313	12.4012	5	15
16	236	13.0508	2.20192	.14333	12.7685	13.3332	5	16
17	221	13.1131	2.69694	.18142	12.7556	13.4707	5	17
18	118	14.1441	2.29930	.21167	13.7249	14.5633	5	18
19	38	14.0526	3.36072	.54518	12.9480	15.1573	5	19
20	10	13.8000	3.85285	1.21838	11.0438	16.5562	7	19
21	17	15.7059	3.07743	.74639	14.1236	17.2882	6	19
Total	1,159	12.3555	2.71399	.07972	12.1991	12.5119	5	19

$F_{10,1148} = 42.551$, p-value < 0.001

7. Tobacco use

When comparing means, tobacco use is also related to earlier age of onset of alcohol use. Students who had never smoked started to drink later than those who reported lifetime tobacco use (M = 11.13; $F_{1,1157} = 5.664$; p-value = 0.017) as well as those who used tobacco in the previous 30 days (M = 11.97; $F_{1,1144} = 4.746$; p-value = 0.030). The results of the linear regression, presented in Table 4, show that the earlier the first use of alcohol, the earlier the use of tobacco, and for each year of delay in the use of alcohol, there is an increase of 0.31 years in the age of onset of tobacco consumption (p < 0.001).

8. Use of other drugs in the previous 12 months

Students who reported any drug use in the previous 12 months had earlier age of onset of alcohol use than those who did not consume drugs in the previous year (M = 12.06, $F_{1,1110} = 3.940$; p-value = 0.047). When analyzed separately (per each drug), there were significant differences for the use of cannabis (M = 11.76, $F_{1,1098} = 6.069$; p-value = 0.014), of tranquilizers (M = 11.60, $F_{1,1084} = 3.967$; p-value = 0.047), and opiates (M = 9.17, $F_{1,1082} = 8.277$; p-value = 0.004).

Discussion

1. Limitations of this study

The study was performed with students, being excluded from the sample adolescents who dropped out or who have already finished their studies. Besides, the data collection was not remade for students who did not attend school in the day the questionnaire was administered. Absenteeism and school drop-out are related to substance abuse, thus, it is possible that our data are underestimated. As this is a cross-sectional study, it only allows seeing the "picture" in a certain time point. Data obtained were related to the "report" of the behavior rather than to the behavior itself, giving room to over- or under representation of the behavior, including a recall bias, which may have occurred specially with older adolescents, resulting in a misreporting of the age of onset.

Although the data collection was performed at classroom, during the school period, without the presence of the teacher, being the participation volunteer, with anonymity and confidentiality assured, possible information biases should be considered when answering the questionnaire, such as lack of attention or understanding; memory error; lack of seriousness; haste to finish the questionnaire; self-censorship and suspicion that school authorities might demand access to the questionnaires answered. On the other hand, self-administered instruments use to leave respondents more comfortable to answer the questions, especially those they consider confidential. It may be that the instrument used was extensive enough to discourage some students, especially those with reading difficulties and also the youngest. This might have happened despite being offered the possibility of skipping questions, ideally used to decrease the answering time of the youngest students, based on the presupposition that these had less experiences related to the behaviors studied. Although the sample was representative of Paulinia's population, this study was conducted only in this city and as it is not part of a more comprehensive multicentric study; its findings may not be generalizable. Nevertheless, it allows for the comparison

Table 3 - Percentage of frequency of consumption patterns in the previous 30 days by gender and age range of first consumption

	Alcohol use (n = 1,159)						Drunkenness (n = 1,147)						Binge drinking - 5 or more doses (n = 1,110)					
Gender	M		F		T		M		F		T		M		F		T	
Age of starting	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
≤ 10	87	66.9	74	58.7	161	62.9	33	25.8	25	20.0	58	22.9	38	32.2	34	28.1	72	30.1
11-12	82	62.6	108	66.7	190	64.8	24	18.8	17	10.6†	41	14.2*	34	27.6	48	30.8	82	29.4
13-14	95	69.3	143	65.6	238	67.0	31	22.8	39	18.1	70	19.9	46	34.8	50	24.0	96	28.2
≥ 15	90	72.0	78	60.0	168	65.9	25	20.3	23	17.6	48	18.9	44	35.5	28	21.9	72	28.6§
Total	354	67.7	403	63.3	757	65.3	113	21.9	104	16.5	217	18.9	162	32.6	160	26.1	322	29.0

Legend: M = male; F = female; T = total
† *Significant difference between age groups ≤ 10 and 11-12 among girls; p = 0.027*
* *Significant difference between age groups ≤ 10 and 11-12; p = 0.009*
§ *Significant difference between age groups 11-12 and ≥ 15; p = 0.008*

Table 4 - Linear regression for age of first tobacco consumption

Age of starting tobacco consumption				
Variables	coefficient	Standard error	T	p-value
Constant	1.17	0.93	1.26	0.207
Age of first alcohol use	0.31	0.04	7.72	< 0.001
Age	0.49	0.06	8.00	< 0.001
Gender				
Male	-0.57	0.20	-2.79	0.005
Economic class				
AB	0.19	0.29	0.66	0.512
C	0.09	0.26	0.33	0.744
Work	-0.17	0.23	-0.72	0.471
Catholic	0.29	0.20	1.41	0.160
Household – living with				
Mother	0.52	0.28	1.88	0.061
Father	-1.92	0.63	-3.07	0.002
Mother and stepfather	-0.38	0.39	-0.99	0.325
Father and stepmother	-0.32	0.76	-0.42	0.672
Other family members	-0.38	0.46	-0.83	0.409
Other	-0.91	0.55	-1.65	0.100

$R^2 = 0.35$

of its findings with national and international studies. Despite its limitations, the current study reveals important data.

Our study highlighted some key aspects. Firstly, we observed that those who had drunk in earlier ages presented a greater frequency of current alcohol use, and they have also got intoxicated more often and had more drinks per occasion. These findings suggest a greater risk of alcohol related problems (abuse and dependence) for those who had a precocious first alcohol use. At ages 11-14 adolescents experience a substantial variety of psychological and social changes, which will be valuable instruments for their functioning in adulthood. The onset of alcohol use in this period may critically interfere with this process, leading to an escalade to heavier and more frequent consumption patterns. Adolescents undergo crucial transitions, which are sources of anxiety and stress, which may lead to an increase in academic and social problems. Adolescents who start drinking (and using other drugs) in this context have higher chances of adopting the frequent use of alcohol as a strategy to deal with these situations. Andersen et al. accomplished a follow-up study with a sample of 847 15-year-old adolescents, who were interviewed again at the age of 19 (n = 729).[1] Alcohol consumption at the age of 15 (regardless the pattern) increased the probability of alcohol use above the WHO patterns at the age of 19 (OR = 1.1-3.5) for both genders. Therefore, the trajectory of alcohol consumption during adolescence is an important predictive factor for the alcohol consumption pattern in adulthood.[22]

Secondly, the first use of alcoholic beverages in adolescence was very frequent (62.2% in our sample). Especially in earlier years of adolescence (in our sample, 78.0% of those who had already drunk, started using alcohol before 15 years of age), the chance of evolution towards dependence is greater both when compared to the absence of consumption,[23] and to the consumption in later phases of adolescence.[24] In this sense, for 6 years, Bonomo et al. followed-up a sample with 1,943 students, being initially interviewed at the ages of 14-15 and afterwards at the ages of 20-21.[25] The recreational use of alcohol in adolescence was clearly predictive of dependence at the beginning of adulthood. DeWit et al. accomplished a survival analysis with 5,856 individuals in the community with antecedent of alcohol use in lifetime and noticed a dependence rate of almost 14% among individuals who started the consumption of alcohol before the age of 14 and of only 2% for those who had their first episode of use after the age of 19.[10] Grant et al. accomplished one study with 5,792 individuals in the community and noticed that the probability of alcohol dependence decreased by 5-9% per each year the first use was delayed.[11]

Thirdly, the early start of alcohol consumption was also associated with higher chance of tobacco and drug use in the previous 30 days in our sample. This finding suggests that both alcohol and tobacco are gateways to other drugs, such as cocaine, crack and cannabis. In consonance with that, Jackson et al. followed-up for 5 years 4,831 adolescents and observed that alcohol consumption was predictive of the use of cigarettes, especially at earlier ages.[17] Similarly, Grant et al. interviewed 8,160 male twins. After excluding the genetic and environmental influence, the authors reported that the more precocious the start of alcohol use, the higher the current risk of use of illicit drugs.[26]

Despite the relevance of the age of onset of alcohol consumption as a predictor of future alcohol-related complications, the development of alcohol harmful use and dependence in adulthood is influenced by innumerable predictive factors, being these sometimes considered as more important and determinant than drinking in adolescence.[27] For example, the association between starting the consumption and the facilitated access to alcohol increases the probability of adopting more heavy patterns of alcohol use after reaching the majority.[8] Within the family, the presence of antecedents of alcoholism and unduly use of alcohol by family members,[2,24,28] as well as the presence of negative interactions with the parents[29,30] increase the risk of dependence among those who started drinking precociously, when compared to precocious users of alcohol who were free from these variables. Other psychosocial variables such as low schooling level, living conditions, maternal alcohol consumption,[31] low engagement with school[29] as well as psychiatric comorbidities[28,30] also seem to increase the risk of future problems.

Fourthly, those who reported usually drinking at home started alcohol use at an earlier age than those who reported drinking with friends. There is a cultural belief in our society that drinking with parents may perform a "protective role for alcohol dependence", nevertheless, delaying children's alcohol first use consists in a real and effective preventive strategy.

Finally, the fact that 99.1% of those who had already drunk had done it before age of 18, reveals a deep inefficacy of alcohol social control, since its sales are forbidden to minors. Thus, we suppose that family and social acceptance towards alcohol, as well as the lack of an effective enforcement contribute to a precocious exposure of infants and adolescents to this substance and, consequently, to other drugs. In addition, low price, widespread advertising, huge commercial availability, act concurrently, collaborating to what has been called "the perfect storm", i.e., a sequence of errors and neglects as foundation factors to a devastating outcome for public health.[32]

Even considering the existence of several other factors capable of influencing the drinking behavior of the youth, such as family and social context, personality, expectations and beliefs, price, commercial availability and easiness of acess,[33] the age of onset of alcohol consumption was relevant in the literature and in our study and must be used as a basis for the planning of public policies and preventive

strategies, such as the establishment and enforcement of a minimal legal age to purchase and consume alcoholic beverages.

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