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Addictive Behaviors



Prevalence of Cocaine Use in Brazil: Data from the II Brazilian National Alcohol and Drugs Survey (BNADS)

Renata Rigacci Abdalla^{a,*}, Clarice S. Madruga^a, Marcelo Ribeiro^a, Ilana Pinsky^a,
Raul Caetano^b, Ronaldo Laranjeira^a

^a National Institute of Policies on Alcohol and Drugs (INPAD) of the Psychiatry Department of the Federal University of São Paulo (UNIFESP), Brazil

^b University of Texas School of Public Health, Dallas Regional Campus, USA

HIGHLIGHTS

- Crack/cocaine last year consumption rate was 2.2% (3.7% in men and 0.7% in women)
- Snorted cocaine last year consumption rate was 1.7% (2.9% in men and 0.6% in women)
- Smoked cocaine last year consumption rate was 0.8% in Brazil
- Cocaine addiction prevalence was 0.6% in the population and 41.4% among users
- Younger participants and men were more likely to use cocaine.

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ABSTRACT

Objective: To determine the current prevalence rates of cocaine use and dependence in a representative sample of the Brazilian population, and to investigate possible associations with sociodemographic factors.

Method: The Second Brazilian Alcohol and Drugs Survey (II BNADS) interviewed 4607 individuals aged 14 years and older from the Brazilian household population including an oversample of 1157 adolescents (14 to 18 years old). The survey gathered information on alcohol, tobacco and illegal substances use as well as on risk factors for abuse and dependence. The Severity of Dependence Scale was used to evaluate cocaine dependence rates among users.

Results: Last year consumption of crack-cocaine was 2.2% in the overall population excluding the elderly group. Lifetime and last year prevalence rate of snorted cocaine was 3.9% and 1.7%, respectively. Smoked cocaine use in Brazil was estimated in 1.5% for lifetime and 0.8% for last year use. Cocaine addiction was identified in 41.4% between users in the prior year.

Conclusions: The prevalence rates of snorted and smoked cocaine in Brazil suggests that the country is amongst the nations with greatest annual consumption rates becoming one of the biggest consumer markets of cocaine worldwide. Prevention and treatment policies should take this into consideration and strengthen the focus on cocaine use in the country.

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1. Introduction

Brazil has been identified by the United Nations Office on Drug and Crime as one of the emerging nations where the use of stimulants such as cocaine – used either intranasally (“powder”) or smoked (crack, and its related forms “merla” or “oxi”) – is increasing (United Nations Office on Drugs and Crime, 2012), contrasting to countries

where cocaine use has been gradually decreasing such as the United States of America or where consumption has stabilized such as the majority of the European countries. There are many reasons for the suggested elevated consumption rate: (i) Brazil's geographic position, neighbouring the world's largest cocaine producers – Peru, Colombia and Bolivia, (ii) its young population (Brazil has nearly 35% of its population is 15 to 34 years of age (IBGE, 2010)), (iii) the socio-economic raise seen in the last decade in Brazil, which represents higher purchasing power and (iv) the cheap price of cocaine in the country (United Nations Office on Drugs and Crime, 2012).

According to the United Nations Office on Drugs and Crime latest Drug Report, cocaine seizures have moved to source areas in South America (responsible for 60% of the seizures in 2009) and away from

* Corresponding author at: Unidade de Pesquisa em Álcool e outras Drogas (UNIAD), Departamento de Psiquiatria, Universidade Federal de São Paulo, Rua Borges Lagoa 570 sala 82 - Vila Clementino São Paulo - SP - 04038000 - Brazil. Tel.: +55 1 199 970 0973; fax: +55 115 579 0640.

E-mail address: rerigacci@terra.com.br (R.R. Abdalla).

consumer markets in North America and Western and Central Europe. Some countries that usually played a secondary role in South America, such as Brazil, seem to have acquired a growing importance not only in cocaine trafficking transit, but also as a substantial consumer market (UNODC, 2011).

Growing seizures and increasing demand for treatment services could imply a rise in cocaine consumption. According to World Drug Report 2012, in Brazil, federal seizures of cocaine amounted to 27 tons in 2010, three times the amount of 2004. A survey of high school and college-age students from all Brazilian capitals showed a significant increase from 1.7% to 1.9% in cocaine consumption between 2004 and 2010 (CEBRID, 2010).

Cocaine consumption is highly associated with medical and psychiatric morbidities contributing to several health, family and social problems (Ribeiro, Dunn, Sesso, Lima, & Laranjeira, 2007). The impact of cocaine consumption is a major health and social concern as it is probably the illicit drug most often associated to trafficking-related violence in America (United Nations Office on Drugs and Crime, 2012). The harm associated with cocaine use such as visits in emergency rooms due to overdoses, deaths, violent behavior and legal problems creates a heavy burden to the society (Deegenhardt & Hall, 2012). The expansion of the cocaine market exposes the need to deal with cocaine as a global issue. The development of effective prevention strategies is urgently needed to deal with social burden associated with cocaine use.

Knowledge of consumption levels and dependence prevalence rates in the overall population is essential for the development of effective prevention strategies and to establish public policies priorities. It is also relevant to describe patterns of use in each age group since prevention and treatment strategies should take into account the different needs and characteristics of each stage of life and the results may show support for prevention and early intervention.

It is well established the high prevalence of mood disorders among illicit substance users (Brown, Goske, & Johnson, 2009). We found this high association using data from the first wave of I BNADS (Madruga et al., 2012) and that's the reason why depression was used as a covariate.

The present study aimed to estimate the prevalence rates of snorted and smoked cocaine consumption as well as dependence rates in a nationally representative sample of the Brazilian population using data from the second Brazilian National Alcohol and Drugs Survey (II BNADS).

2. Material and methods

2.1. Sampling and procedures

The Second Brazilian National Alcohol Survey (II BNADS) was conducted between November 2011 and March 2012. A multistage cluster sampling procedure was used to select 4607 individuals aged 14 years and older from the Brazilian household population including an oversample of 1157 adolescents (14 to 18 years old). The overall response rate was 77% and the adolescents oversample response rate was 79%. The sampling involved 3 stages: 1) selection of 149 counties using probability proportional to size methods (PPS); 2) selection of 2 census sectors for each county, totalling 375 census sectors, also using PPS and 3) within each census sector 8 households were selected by simple random sampling, followed by the selection of a household member to be interviewed using the "the closest future birthday" technique. Data were collected through one-hour face-to-face interviews conducted in the respondent's home by trained interviewers using a standardized questionnaire. A team of one hundred professional interviewers were trained by Ipsos and II BNADS coordination and identified as "Federal University of São Paulo researchers". Telephone and online conferences were scheduled to assist further questions during the process. Questionnaires, in its entirety (100%), were checked for its consistency and 20% of the questionnaires performed by each interviewer were inspected to verify the application method.

2.1.1. Ethics

All respondents granted their informed consent. This study was approved by the Ethics Committee of the Federal University of Sao Paulo.

2.2. Measurements

Over 15 instruments evaluating consumption of all psychotropic substances and several risk factors composed the original questionnaire. The present analysis focuses on the main sociodemographic variables (gender, age, marital status, schooling years, school attendance, family income and work status) as well as all the cocaine use assessment. Patterns of cocaine use were investigated through questions covering lifetime use; age of onset; frequency of use in the last month and in the last 12 months.

Cocaine dependence was identified by the Severity of Dependence Scale (SDS). The Severity of Dependence Scale (SDS) is based on DSM-IV criteria and assesses the psychological aspects of substance dependence related to feelings of control, worry and anxiety about consumption. The questionnaire is composed by five items: 1) Did you ever think your use of cocaine was out of control? 2) Did the prospect of missing a line make you very anxious or worried? 3) Did you worry about your use of cocaine? 4) Did you wish you could stop? 5) How difficult would you find it to stop or go without cocaine?. They are scored on a four-point Likert domain: first four items (0 = never or almost never; 1 = sometimes; 2 = often; 3 = always or nearly always), and item 5 (0 = not difficult; 1 = quite difficult; 2 = very difficult; 3 = impossible). Item scores are added to give a total SDS score, which can range from 0 to 15 with 15 representing the highest level of dependency. The psychometric properties of the SDS have been well established in adult populations, as well as adolescent ones. It demonstrates high test-retest correlations and good internal consistency. The cutoff point of 4 was adopted to define cocaine dependence (Ferri, Marsden, de Araujo, Laranjeira, & Gossop, 2000); (Gossop et al., 1995); (Kaye & Darke, 2002); (Martin, Copeland, Gates, & Gilmour, 2006).

Other illicit substance consumption was assessed using self-reported measures of lifetime use and in the last 12 months but these data will not be described in the present manuscript.

Depression was assessed using the Brazilian validated version of the 20-item Center for Epidemiological Studies Depression Scale (CES-D), using the score 16 as the cutoff point (Batistoni, Neri, & Cupertino, 2007), (Bradley, Bagnell, & Brannen, 2010), (Fleck et al., 2002).

2.3. Statistical analysis

Statistical analyses were conducted using STATA (Data Analysis and Statistical Software) version 10. Given the multi-stage stratified sampling design, all analyses were weighted to take account of differing selection probabilities at each stage, and of non-response using post-stratification. All estimates of prevalence and association were made using the appropriate STATA survey commands (*svy*) to generate robust standard errors. Sociodemographic characteristics and patterns of cocaine use were described by gender, overall sample and age group. Further descriptive data was estimated using the age cut of 15 to 59 to allow comparison with age group proposed by the United Nations of Drug and Crime and merged snorted and smoked cocaine use in one category. Data was also described by the Brazilian regions: (1) *North Region*, composed by Amazonas, Pará, Acre, Rondônia, Roraima, Amapá, and Tocantins, (2) *Northeast Region*, composed by Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Bahia, Alagoas and Sergipe, (3) *Central-West Region*, composed by Mato Grosso, Mato Grosso do Sul, Goiás and the Distrito Federal, (4) *Southeast Region*, composed by Rio de Janeiro, São Paulo, Minas Gerais and Espírito Santo and (5) *South Region* composed by Paraná, Santa Catarina and Rio Grande do Sul.

Depression scores were used as a control to adjust all regression models. Poisson regression analysis was used to test associations between

sociodemographic characteristics and cocaine use. All models were mutually adjusted.

3. Results

3.1. Cocaine consumption prevalence rates

Prevalence rates in each category of sociodemographic variables are shown by gender and overall sample in Table 1.

3.1.1. Snorted cocaine

The prevalence of lifetime snorted cocaine use in the general population was estimated in 3.9%, whilst 1.7% had used the substances at least once in the prior year.

Lifetime and last year rates of snorted cocaine were 6.4% and 2.9% respectively among men, and 1.6% and 0.6% for lifetime and last year use among women.

During adolescence (14 to 19 years of age) lifetime use was 3.6% (6.7% within male and 0.5% among females) and 2.4% of them used the substance at least once in the prior year (4.5% among males and 0.3% among females).

Over two thirds of the participants who had used cocaine in the prior year used it in the previous month; whereas 40.2% used it at least twice, 13.4% used up to 5 times in the previous month and 19.1% reported having used over six times in that period.

3.1.2. Smoked cocaine

The estimations of smoked cocaine were 1.5% and 0.8% for lifetime and last year use respectively. Among adolescents we found that 0.8% had used it at least once in their lifetime whilst 0.2% used it during the last year.

3.1.3. Consumption of cocaine in the prior year – age group 15 to 59

To be able to compare our data with international rates we used here the age interval of 15 to 59 years old proposed by the United Nations of Drug and Crime and merged snorted and smoked cocaine use in one category. Using this criteria we found that 2.2% of whole population

used any form of cocaine in the prior year (3.7% men – 0.7% women) and 4.7% used at least once in their lives (7.4% men – 2.1% women).

3.1.4. Cocaine consumption in the Brazilian regions

The Central-West region showed the highest rates of use in the last 12 months both snorted (2.7%) and smoked crack cocaine (1.8%), as the highest prevalence in lifetime use of smoked cocaine (2.6%). The highest prevalence of lifetime snorted cocaine use was observed in Southeast region (5.7%). The South region presented the lowest rates of last year use for snorted (0.8%) and smoked (0.4%) cocaine.

3.2. Snorted cocaine dependence

Cocaine dependence rates in the Brazilian population were 0.6% (0.9% of men and 0.3% women). The rates for those who experimented cocaine at least once in their lifetime were 15.6% (17.6% for women and 15% for men), it augmented to 41.4% among those who used cocaine in the last 12 months. There were differences in the rates according to gender, with the prevalence of dependence reaching 55% among female users compared to 41.4% among males.

3.3. Sample characteristics

The mean age of onset for cocaine use was 18.8 years old, whereas 45% first tried cocaine before the age of 18.

Gender was associated with use, men were 4.4 times more likely to experiment (CI: 3.14–6.21) and 4.8 times more likely to use in the last year (CI:2.77–8.47) compared to women. Age was a protective factor for cocaine use in the prior year and (OR: 0.97 CI: 0.95–0.99). Experimentation was also inversely associated with age (OR: 0.98 CI: 0.97– 0.99). Depression was added to the model to adjust the sociodemographic associations and it was also associated with cocaine experimentation and use in the last year (Table 2).

The rates of school non-attendance among adolescents who used cocaine in the last 12 months were 23.7%, whereas this rate was near 1% between those who did not use in the last year. However, the multivariate analysis showed no significant association between years of education and current cocaine use.

Table 1
Prevalence rates of snorted cocaine consumption according to demographic characteristics.

| | Men | | Women | | Total | |
|------------------|--------------|---------------|--------------|---------------|--------------|---------------|
| | Lifetime use | Last year use | Lifetime use | Last year use | Lifetime use | Last year use |
| Total (MS = 262) | 111 (6.4) | 49 (2.9) | 38 (1.6) | 12 (0.6) | 149 (3.9) | 61 (1.7) |
| Age | | | | | | |
| 14–19 | 21 (6.7) | 13 (4.5) | 5 (0.5) | 3 (0.3) | 26 (3.6) | 16 (2.4) |
| 20–29 | 32 (8.8) | 15 (3.9) | 19 (4.5) | 8 (2.5) | 51 (6.5) | 23 (3.1) |
| 30–39 | 36 (10.8) | 15 (5.0) | 9 (2.1) | 0 | 45 (6.4) | 15 (2.4) |
| 40–49 | 14 (5.6) | 5 (2.0) | 3 (0.9) | 0 | 17 (3.2) | 5 (1.0) |
| 50–59 | 4 (1.5) | 0 | 1 (0.1) | 0 | 5 (0.8) | 0 |
| 60 and older | 4 (1.0) | 1 (0.2) | 1 (0.1) | 1 (0.1) | 5 (0.5) | 2 (0.1) |
| Years of study | | | | | | |
| 1 to 8 years | 28 (4.1) | 12 (1.6) | 11 (1.2) | 3 (0.3) | 39 (2.6) | 15 (1.0) |
| 9 to 12 years | 60 (9.0) | 30 (4.8) | 21 (2.2) | 6 (0.6) | 81 (5.5) | 36 (2.6) |
| 13 or more | 23 (6.2) | 7 (2.1) | 6 (1.4) | 3 (0.9) | 21 (3.5) | 10 (1.4) |
| Attending school | 20 (5.2) | 8 (2) | 7 (1.3) | 1 (0.01) | 27 (3.1) | 9 (1.0) |
| Marital status | | | | | | |
| Single | 48 (7.5) | 29 (5) | 11 (1.9) | 5 (1) | 59 (4.9) | 34 (3.2) |
| Cohabiting | 54 (5.6) | 18 (1.7) | 23 (1.8) | 5 (0.4) | 77 (3.6) | 23 (1.1) |
| Widow/Divorced | 9 (7.0) | 2 (1.6) | 4 (0.6) | 2 (0.2) | 13 (2.5) | 4 (0.7) |
| Family income | | | | | | |
| Until 3 MS | 17 (5.8) | 9 (2.6) | 9 (1.5) | 4 (0.6) | 26 (3.2) | 13 (1.4) |
| 3 to 4 MS | 21 (6.5) | 8 (2.2) | 9 (3.3) | 3 (1.3) | 30 (4.8) | 11 (1.7) |
| 5 or more MS | 22 (9.9) | 9 (4.4) | 4 (1.0) | 1 (0.01) | 26 (5.4) | 10 (2.2) |
| Employed | 90 (7.3) | 37 (3.1) | 20 (1.9) | 2 (0.4) | 110 (5.2) | 39 (2.0) |

Table 2
Multivariate analysis and associations.

| | Cocaine Experimentation | Cocaine Last year use |
|-------------------|----------------------------|--------------------------|
| Gender | | |
| Female | 1.00 | 1.00 |
| Male | 4.41 (3.14–6.21) | 4.85 (2.77–8.47) |
| Age (years) | 0.98 (0.97–0.99) | 0.97 (0.95–0.99) |
| Schooling (years) | 0.99 (0.97–1.01) | 0.99 (0.14–1.41) |
| Depression | 1.04 (1.02–1.05) | 1.05 (1.02–1.07) |

4. Discussion

Brazil is currently experiencing an extensive public debate regarding illegal drugs consumption and legislation (O Estado de São Paulo, 2012). The subject has also gain attention due to the apparent increase in crack-cocaine user in all regions of Brazil. The harms related to cocaine use include damage to mental and physical health, losses in social and family relationships and involvement with violent behaviors, leading to a considerable burden to the society.

Our results have shown that 2.2% of our sample, representing nearly 3.2 million people (aged 14 years and older), have used some form of cocaine (snorted or smoked) during the previous year in Brazil. Approximately 2 million Brazilians have smoked cocaine at least once in their lifetime – 1.5% among adults and 0.8% among adolescents and one in one hundred adults used crack in the past year.

The age of first experimentation of cocaine is an important risk factor indicator, since several studies have shown a relationship between the precocity of use and increased risk of develop dependency and other psychiatric illnesses (Adriani & Laviola, 2004; Chuan-Yu Chen, Storr, ScDb, Anthony, & PhDc, 2009). We found that almost half of the users (45%) have tried cocaine for the first time before 18 years of age. Among adolescents, cocaine use seems to be related to school non-attendance, which highlights the importance of establishing prevention programs and specific treatment protocols for this age group, focusing in young men especially.

The use of smoked cocaine during adolescence was 0.8% and 0.2% for lifetime and last year use respectively. We must point out that our results for smoked cocaine use are most likely underestimated due to the household nature of our study. However, according to the Brazilian Center of Information on Psychotropic Drugs (CEBRID), college and high school students' prevalence of last year use of crack was 0.4%. Again the selection bias must be taken into account once they interviewed the student population and the users have probably dropped out school. This study also found a statistically significant increase in cocaine last year use between 2004 (1.7%) and 2010 (1.9%) and a decrease in crack last year use in the same period (0.7% and 0.4% respectively) (Galduróz JCF, Fonseca, & Carlini, 2004). On the other hand, findings from the United States have shown a decline in both snorted and crack cocaine use in last decade, according to results from the 2006 National Survey on Drug Use and Health (NSDUH, 2011) and Monitoring the Future, 2012 (Johnston, O'Malley, Bachman, & Schulenberg, 2013).

Due to the heterogeneity of the Brazilian population and the territory vastness, differences in consumption rates between the regions must be looked at. Our results have shown that prevalence rates of last year cocaine use across the regions varied from 1.8% to 2.6%. The Southern region presented significant lower rates (0.8% compared to an average of 2%) than the country's prevalence. We hypothesize that the lower consumption rates found in this region might be due the replacement for other stimulants, such as ecstasy – a trend already seen in other countries (UNODC, 2011). The South-East and Central-West regions have higher experimentation and last year rates than most regions, agreeing with previous findings showing associations of consumption with higher socio-economic status (UNODC, 2009). Considering those region's population sizes it must be highlighted that it is where almost half of all the users in the country are concentrated, and that should be

taken into account to encourage government prevention and treatment initiatives. The Central-West region in particular showed significantly higher rates of last year smoked cocaine use, and this might be due its proximity to the producing countries, making this region the main bridge to other regions and countries. Such data should instigate actions towards our border's surveillance and apprehensions.

With regards to gender and dependence rates, our results are in agreement with studies showing that men are more likely to illegal drug use than women whilst women are more vulnerable to develop dependence syndrome (Tuchman, 2010). We detected that half of the female users met the criteria for dependence. It is known that a minority of individuals who use illicit drugs become dependent, but most of the hazard attributable to cocaine is concentrated in problem or dependent users (Degenhardt & Hall, 2012). The prevalence rates of snorted cocaine dependence found in our study are 0.6%, higher than the rates found in a systematic review of prevalence studies of dependence on illicit drugs (0.07 – 0.52%) (Degenhardt et al., 2011). It is possible that the previous studies performed in the country have underestimated this prevalence or, perhaps, the rates might have actually increased during the last few years.

Well planned and supervised public policies are needed to curb the implications of the use of illegal substances, such as cocaine. One example of possibly efficient initiatives is the traffic surveillance. Since February 2013, the Police Department of the State of São Paulo is using devices that can detect if the driver has consumed not only alcohol, but also cannabis and cocaine. These equipment are unprecedented in the country and by Article 306 of the Brazilian Traffic Code, any amount of these substances is sufficient to indict the driver for traffic crime, which can take penalty 6 months to 3 years imprisonment, besides losing the Driver 's License for one year and fined in \$1000.00.

Another project of the of São Paulo state government which is now under implementation, provides financial subsidies for crack dependent already in recovery being assisted by specialized staff through a partnership between public and private services.

In addition, the Brazilian government has launched a federal program with strategies to combat crack use in 2011 (“Crack, é possível vencer”), including actions such as professional training, education campaigns and increasing in treatment network.

Even though the government has been giving better attention to the crack cocaine issue recently, evidence based actions must be considered in every sphere of our system. The implementation of consistent improvements in education and health is essential, including fast and easy access to treatment, support for families and professionals involved in areas such as education, health, social assistance and security and increase the availability of treatment able to provide care to patients at any stage of the disease, from psychosocial rehabilitation centers vacancies hospital for detoxification and crisis intervention.

4.1. Limitations

It is always important to bear in mind that this study is based on cross-sectional study, and therefore we are unable to establish causation. Further, we must take into account the possibility of under reporting, as all the information on drug intake was based on self-reports from the respondents. However, it is known that previous studies have shown that drug users tend to provide reliable data about their consumption habits (Ehrman, Robbins, & Cornish, 1997); (Kim & Hill, 2003), (Lundy et al., 1997).

Even though all the necessary precautions were taken to guarantee discretion during the interviews, the fact that participants answered the questionnaire at home could generate another bias leading to under-reporting. Above all we must take into account selection bias, as smoked cocaine users are usually in the streets and not in the household population. This way all crack cocaine use prevalence rates may be underestimated. The sample is obviously a limitation as well as all the consumption prevalence rates were below 5%, weakening

the power of the multivariate analysis. Nevertheless it is also important to highlight a few strengths of this study. We must point out that our data comes from a nationally representative sample and it is relevant to mention that all interviews were performed by experienced and trained professionals and used reliable and validated measures. It is known that studies of prevalence rates of substance use are scarce, as well as studies with rates of dependence, especially in Brazil. As this country has played an important role both in consumption and as a route for cocaine trafficking, we believe that our data are of utmost importance for the knowledge of the affected population and thus develop strategies to minimize the losses.

5. Conclusions

Knowing the sociodemographic characteristics of the users as well as the main risk factors for addiction is relevant to establish appropriated interventions. The prevalence rates for cocaine use in Brazil are higher than prevalence rates of the all the other countries in South America (0.6% for annual use) as well as the North American countries combined (1.6% for annual use) (United Nations Office on Drugs and Crime, 2012). Due to Brazil's population size – nearly 200 million inhabitants (IBGE, 2010) – the cocaine use prevalence of 2.2% represents roughly 3.2 million people – an enormous market and certainly a heavy burden to the society. The sheer number estimation leads to the assumption that Brazil is most likely among the greatest consumer markets for cocaine worldwide, probably the second, coming behind of the United States of America only.

Brazil is experiencing improvements in social and economic aspects, becoming one of the biggest economies in the world, with lower unemployment rates and increased wages in recent years (IBGE, 2010). Public health initiatives are not being prioritized in spite of the economic progress. Integrated actions in social, educational, health and security areas are also needed. Finally, our results should come as a warning for improvements in prevention strategies and urgent expansion of public addiction treatments.

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Contributors

Renata Rigacci Abdalla and Clarice S. Madruga designed the study. Renata Rigacci Abdalla conducted literature searches and wrote the manuscript. Clarice S. Madruga is the coordinator of BNADS II (II Brazilian National Alcohol and Drugs Survey) and conducted the statistical analysis. Ronaldo Laranjeira, Ilana Pinski and Raul Caetano are the organizers of BNADS II. Marcelo Ribeiro and all the other authors revised it critically. All the authors have approved the final manuscript.

Conflict of interest

None.

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