

# Trends in drug use among students in Brazil: analysis of four surveys in 1987, 1989, 1993 and 1997

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## Abstract

The consumption of psychotropic drugs among Brazilian secondary school students was examined by comparing data from four surveys using a questionnaire adapted from the WHO's Program on Research and Reporting on the Epidemiology of Drug Dependence. Students filled out the form in their classrooms without the presence of teachers. The target population consisted of 10-18-year-old students (on average, 15,000 students responded to each survey) in Brazil's ten largest state capitals: Belém, Belo Horizonte, Brasília, Curitiba, Fortaleza, Porto Alegre, Recife, Rio de Janeiro, Salvador, and São Paulo. Among the legal drugs, lifetime use (use at least once during life) of tobacco was increased in seven cities (the exceptions were Brasília, Porto Alegre and Rio de Janeiro). There was also a significant increase in frequent use of alcohol (six times or more per month) in 6 of the cities, from an average of 9.2% in 1987 to 15.0% in 1997. With respect to illegal drugs, there was a significant increase in lifetime use of marijuana (a 3-fold increase from 2.8% in 1987 to 7.6% in 1997). Cocaine use increased 4-fold over the survey period (0.5% in 1987 to 2.0% in 1997). Lifetime use of cocaine significantly increased in eight capitals (except Recife and Rio de Janeiro). However, frequent cocaine use increased in only three capitals (Belém, Fortaleza and Porto Alegre), from an average of 1.0% in 1987 to 3.6% in 1997. Lifetime use of medications such as anxiolytics and amphetamines increased 2-fold on average over the survey period. Comparing the four studies, the main conclusion is that there were significant increases in the frequencies for lifetime use, frequent use and heavy use of many drugs.

## Key words

- Students
- Trends
- Inhalants
- Cocaine
- Marijuana
- Surveys
- Brazilian students

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## Introduction

There is widespread concern about drug use among students in many parts of the world. An indication of the magnitude of this use may be obtained from epidemiological surveys, which are essential to the framing of public policies and are internationally ac-

knowledged as useful (1-7). Many regional studies in Brazil have expressed concern over the use of psychotropic drugs among students (8-16).

Unfortunately, surveys tend to use different instruments so it is not always possible to compare their findings; furthermore, there are methodological problems involved in

some studies. For this reason, CEBRID (Centro Brasileiro de Informações sobre Drogas Psicotrópicas, Brazil) conducted the first national survey on the issue in ten state capitals in 1987 (17).

In 1989, 1993 and 1997, three further studies were performed using the same methodology and in the same cities, thus enabling us to compare student drug use at different points in time. A comparison of the findings of these four surveys is extremely important to understand the behavior of Brazilian students concerning psychotropic drugs over time. This paper reports on trends in drug use among Brazilian students and compares results from four nationwide prevalence studies.

### **Patients and Methods**

Data were collected using a questionnaire formulated by WHO-Research and Reporting on the Epidemiology of Drug Dependence (18), and adapted for use in Brazil by Carlini-Cotrim et al. (17). CEBRID used the same questionnaire for the four surveys in the same cities which was anonymously filled out in classrooms without the presence of teachers, after the organizers had briefly explained the aims of the survey. Students were free to answer in any way or to hand in a blank questionnaire. A 'ballot box' placed in front of the classroom ensured anonymity.

The questionnaire collected socio-demographic data (gender, age, school grade, socioeconomic level), frequency of school attendance, use of non-prescription psychotropic drugs (anxiolytics, amphetamines, anticholinergics, barbiturates, codeine-based cough syrups, and opiate analgesics), alcohol, tobacco and illegal drugs (inhalants, marijuana and cocaine). A fictitious drug was included in the questionnaire to test for authenticity. Socio-economic status was measured using the scale of the Brazilian Association of Market Survey Institutes, which is based on consumption items and on

the educational level of the head of the household. The scale classifies respondents in classes A to E, with A being the highest and E the lowest.

The target population consisted of students from the fifth grade on, which corresponds to elementary school and high school (10 to at least 18 years of age) in public school systems, in the ten largest state capitals and covering the following five regions of Brazil, that differ economically, socially, climatically and racially from each other: North (Belém), Northeast (Fortaleza, Recife and Salvador), Center (Brasília), Southeast (Belo Horizonte, Rio de Janeiro and São Paulo), and South (Curitiba and Porto Alegre).

Sampling was clustered (by school) and stratified (for different neighborhoods in each city and their socio-economic characteristics) into two stages, first by school then by class as proposed by Kish (19). Data correction basically included three separate sub-phases.

### **Quantitative analysis**

To detect and correct typing errors when the data were collated, such as a 160-year-old student, 5% of the questionnaires from each city were selected at random and submitted to thorough manual checking.

### **Qualitative analysis**

Since all questions contained several items, split-half reliability testing was applied to eliminate inconsistencies such as answering no to item "a" (lifetime use) and yes to item "b" (used in the last year).

### **Drug analysis**

We checked whether the drug mentioned was psychotropic or not or even if it belonged to the set of drugs in question. Typing errors were corrected, inconsistencies were reviewed manually and drugs were reallo-

cated to their proper categories. All questionnaires containing affirmative responses for the fictitious drug, or containing more than three invalidated or blank responses were excluded from the questionnaire. On average, 15,000 students answered the questionnaire and about 2% were excluded from each survey.

According to the WHO classification (18), the use of drugs by the students surveyed was divided into three groups: lifetime use: when the subject had used any psychotropic drug at least once in his/her life; frequent use: when the subject had used a psychotropic drug six or more times during the 30 days preceding the study; heavy use: when the subject had used a psychotropic drug 20 or more times during the 30 days preceding the study.

### Statistical analysis

Better analysis of the data related to psychotropic drug consumption over many years is required, in the form of a sequence of events. This presentation enables us to analyze developments and detect future trends. Therefore, the chi-square test for trends with a 5.0% level of significance was applied to the results from the four surveys. This test is used "if the table of data has two columns and three more rows (or two rows and three or more columns), and the categories can be quantified" (19,20). This test determines "whether there is a linear trend between row (or column) number and the fraction of subjects in the left column (or top row)" (20). Data were presented in an expanded form. In probabilistic sampling such as that used for the four surveys, results may be expanded to the entire population surveyed using sample weighting. The expansion fraction was the result of division of the total number of classrooms by the number of schools sampled. The sample design predicted that each student would have the same probability of being selected (19,21).

## Results

Sample sizes were 16,149 in 1987, 19,183 in 1989, 24,634 in 1993, and 15,501 in 1997. A larger number of female students were included in all four surveys, which is in line with the proportions recorded by the census in Brazil. Another important aspect was the age-group/grade discrepancy (students not in the grade corresponding to their age-group), which was the case for over 50% of students in all cities surveyed and in all four surveys. In the fourth survey, 78.7 and 78.3% of students in Salvador and Recife were not in the corresponding grades.

Table 1 shows the frequency of lifetime use of psychotropic drugs in general by city. The frequency observed in São Paulo and Rio de Janeiro (cities in the Southeast region) and Salvador (Northeast) showed a statistically significant decrease in lifetime use in contrast to Belém (North), Fortaleza (Northeast), Curitiba and Porto Alegre (South), where there was an increase. Nevertheless, taking the ten cities as a whole (last line in Table 1), it may be inferred that there was no change in the lifetime use frequency over the four studies. On the other hand, Figure 1 shows that inhalants were most frequently indicated as "lifetime use" in all

Table 1. Analysis of the frequency of drug consumption among elementary and high school students in ten Brazilian capitals in 1987, 1989, 1993 and 1997.

Capitals	1987	1989	1993	1997	$\chi^2$ for trends
Belém	13.5	21.6	16.9	24.5	↑ P < 0.01
Belo Horizonte	21.6	34.2	24.9	23.1	n.s.
Brasília	26.3	24.0	22.0	25.0	n.s.
Curitiba	15.6	20.7	20.0	26.3	↑ P < 0.01
Fortaleza	17.6	21.5	22.4	28.1	↑ P < 0.01
Porto Alegre	21.1	24.3	22.9	29.5	↑ P < 0.01
Recife	23.5	28.8	26.8	25.9	n.s.
Rio de Janeiro	25.6	29.3	22.8	22.0	↓ P < 0.01
Salvador	22.5	25.6	20.7	20.9	↓ P < 0.01
São Paulo	23.5	30.6	26.6	18.5	↓ P < 0.01
Total	21.1	26.1	22.6	24.4	n.s.

n.s. = not significant; ↑ = significant increase; ↓ = significant decrease (chi-square test for trends).

four surveys (1987, 1989, 1993 and 1997), excluding tobacco and alcohol from the analysis. Note that, with the exception of Porto Alegre, where marijuana appears for the first time as the most frequently used drug for lifetime use, in the other cities surveyed, inhalants continued to be the drugs most

frequently used for lifetime use. Among the six most frequently used drugs, a statistically significant increase in the number of students using these drugs was observed for three of them - marijuana, anticholinergics and cocaine.

The analysis of the frequency for lifetime

Figure 1. Comparison among the surveys (1987, 1989, 1993 and 1997) for the six most used drugs in ten Brazilian capitals. Note the statistically significant increase of the tendency of lifetime use of amphetamines, marijuana and cocaine (\* $P < 0.01$  compared to other surveys; chi-square test for trends).

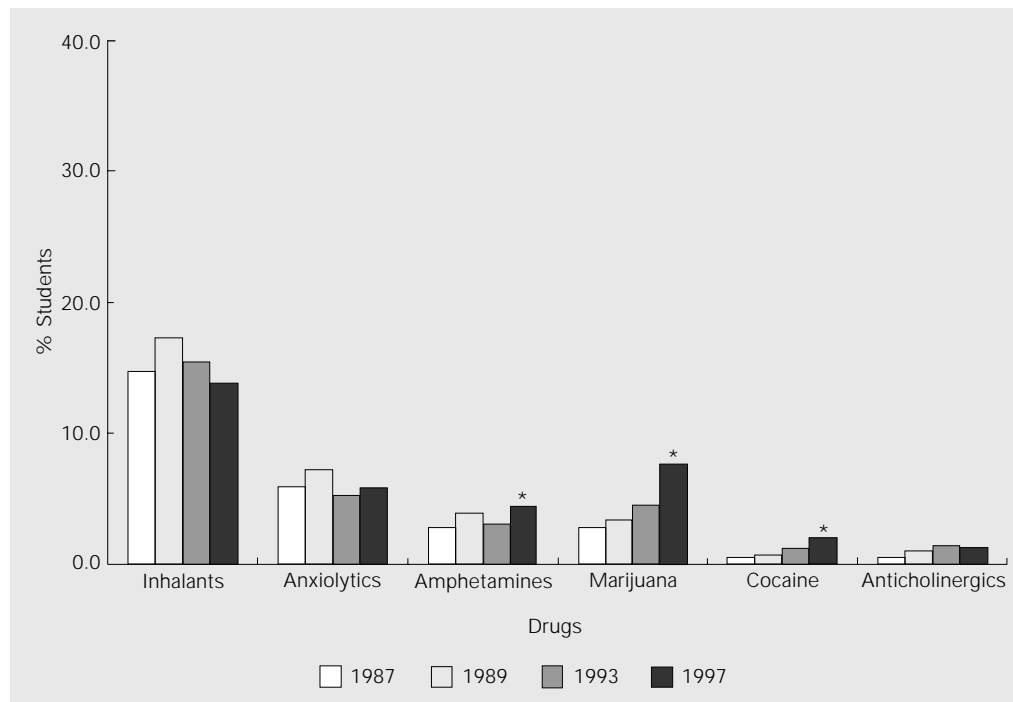


Table 2. Analysis of the frequency of drug consumption among elementary and high school students in ten Brazilian capitals according to sex in 1987, 1989, 1993 and 1997.

Capitals/Region*	Male sex (%)					Female sex (%)				
	1987	1989	1993	1997	$\chi^2$ for trends	1987	1989	1993	1997	$\chi^2$ for trends
Belém	13.3	26.3	21.2	29.5	$\uparrow P < 0.01$	13.6	19.0	13.7	21.4	$\uparrow P < 0.01$
Belo Horizonte	22.5	32.8	26.0	25.6	n.s.	20.4	35.2	23.9	22.1	n.s.
Brasília	27.0	29.9	23.4	28.2	$\uparrow P < 0.01$	25.3	20.1	20.8	22.5	n.s.
Curitiba	16.0	22.7	20.6	27.4	$\uparrow P < 0.01$	15.1	19.6	20.0	25.7	$\uparrow P < 0.01$
Fortaleza	20.4	22.0	26.4	31.1	$\uparrow P < 0.01$	16.0	20.8	19.7	25.7	$\uparrow P < 0.01$
Porto Alegre	18.3	23.1	22.8	29.8	$\uparrow P < 0.01$	24.2	25.1	24.1	29.5	$\uparrow P < 0.01$
Recife	26.8	31.2	32.3	32.9	n.s.	21.5	27.5	22.9	22.0	n.s.
Rio de Janeiro	26.0	30.0	23.5	18.9	$\downarrow P < 0.01$	25.2	29.3	21.9	24.2	n.s.
Salvador	23.7	27.2	22.4	24.1	n.s.	22.2	24.6	20.0	18.6	n.s.
São Paulo	25.1	32.2	27.3	20.3	$\downarrow P < 0.01$	22.8	29.7	25.8	17.3	$\downarrow P < 0.01$
Total	21.9	27.7	24.6	26.8	n.s.	20.6	25.1	21.3	22.9	n.s.

\*Regions: North, Belém; Northeast, Fortaleza, Recife and Salvador; Center-West, Brasília; Southeast, Belo Horizonte, Rio de Janeiro and São Paulo; South, Curitiba and Porto Alegre.

n.s. = not significant;  $\uparrow$  = significant increase;  $\downarrow$  = significant decrease (chi-square test for trends).

use of drugs by sex comparing the four studies can be seen in Table 2. There was a statistically significant decrease in use among the male population in the cities of São Paulo and Rio de Janeiro. The opposite - a significant increase - occurred in Belém, Brasília, Curitiba, Fortaleza and Porto Alegre. Analysis of the female segment showed a significant increase in lifetime use in Belém, Curitiba, Fortaleza and Porto Alegre, and a significant decrease in São Paulo.

Table 3 shows drug consumption in general (lifetime use) by age group in the four surveys. No changes were observed over the years in any of the age groups studied. The most significant percentage of users was detected among students older than 16. There were some extremely high percentages among very young students (10-12) who had already used some kind of psychotropic drug during their lives. In 1989 a total of 17.7% of the students in this age group reported drug use (not including alcohol and tobacco).

In the study of the lifetime use of psychotropic medications for the ten cities as a whole, there was a statistically significant increase in the use of amphetamines and anxiolytics. The same applied to marijuana and cocaine when comparing the four studies (Table 4). Lifetime use of inhalants, at almost 1%, was higher than use of anticholinergics, barbiturates and opiates. Note also that lifetime use of alcohol and tobacco remained relatively stable in the comparison between the four surveys (Table 4).

The analysis of the frequent use trend in general (six or more times in the 30 days preceding the survey) for the ten cities is shown in Table 5. A significant increase in frequent use was seen in Belém, Fortaleza and Porto Alegre, as opposed to a decrease in Recife, Rio de Janeiro and São Paulo when comparing the four surveys (1987, 1989, 1993 and 1997).

Table 6 illustrates the frequency of frequent use in percentage for the seven drugs most used by the students. Comparison of

Table 3. Analysis of the frequency of drug consumption among elementary and high school students in ten Brazilian capitals in 1987, 1989, 1993 and 1997 according to age group, in the public school system.

Age bracket	1987	1989	1993	1997	$\chi^2$ for trends
10-12 years	14.2	17.7	14.5	12.4	n.s.
13-15 years	19.3	25.5	20.3	21.7	n.s.
16-18 years	27.4	30.7	26.7	31.2	n.s.
>18 years	30.1	32.3	31.7	34.5	n.s.
Total	22.8	26.6	23.3	25.0	n.s.

n.s. = not significant (chi-square test for trends).

Table 4. Analysis of consumption of psychotropic drugs among elementary and high school students in ten Brazilian capitals in 1987, 1989, 1993 and 1997.

Drugs	1987	1989	1993	1997	$\chi^2$ for trends
Inhalants	14.7	17.3	15.4	13.8	n.s.
Anxiolytics	5.9	7.2	5.3	5.8	n.s.
Amphetamines	2.8	3.9	3.1	4.4	↑ P < 0.01
Marijuana	2.8	3.4	4.5	7.6	↑ P < 0.01
Cocaine	0.5	0.7	1.2	2.0	↑ P < 0.01
Anticholinergics	0.5	1.0	1.4	1.3	n.s.
Barbiturates	1.6	2.1	1.3	1.2	n.s.
Syrups/Codeine*	1.3	1.5	1.3	1.0	n.s.
Total number of users <sup>+</sup>	21.1	26.1	22.8	24.7	n.s.
Alcohol	77.4	80.2	82.1	78.0	n.s.
Tobacco	29.3	31.8	29.1	31.2	n.s.

\*Codeine base used for syrups. <sup>+</sup>Excluding alcohol and tobacco.

n.s. = not significant; ↑ = significant increase (chi-square test for trends).

Table 5. Analysis of the frequency of frequent use of drugs among elementary and high school students in ten Brazilian capitals in 1987, 1989, 1993 and 1997.

Capitals	1987	1989	1993	1997	$\chi^2$ for trends
Belém	1.0	2.3	1.7	3.6	↑ P < 0.01
Belo Horizonte	3.2	5.1	4.3	3.2	n.s.
Brasília	4.1	3.3	3.2	3.2	n.s.
Curitiba	2.2	2.2	3.0	3.3	n.s.
Fortaleza	1.4	3.2	2.4	3.7	↑ P < 0.01
Porto Alegre	3.2	3.8	3.1	5.2	↑ P < 0.01
Recife	3.4	4.4	3.4	2.9	↓ P < 0.01
Rio de Janeiro	2.6	3.7	3.2	2.4	↓ P < 0.01
Salvador	2.8	2.7	2.2	2.7	n.s.
São Paulo	2.8	3.9	3.8	2.3	↓ P < 0.01
Total	2.7	3.5	3.0	3.2	n.s.

\*Regions: North, Belém; Northeast, Fortaleza, Recife and Salvador; Center-West, Brasília; Southeast, Belo Horizonte, Rio de Janeiro and São Paulo; South, Curitiba and Porto Alegre.

n.s. = not significant; ↑ = significant increase; ↓ = significant decrease (chi-square test for trends).

the four studies indicated that there was an increase in the frequent use of marijuana, amphetamines, anxiolytics and cocaine in the analysis of the 10 cities as a whole. Although inhalants showed the highest percentages for lifetime use, their frequent use remained stable between 1.7% in 1987 and 2.0% in 1997. Legal drugs followed the same trend as inhalants, and their frequent use varied from 11.2% in 87 to 15.0% in 97 for alcohol and from 7.0% (1987) to 6.2% (1997) for frequent use of tobacco (Table 6).

Heavy use of drugs (more than 20 times in the 30 days preceding the survey) never reached values of more than 1% for any of the drugs studied, whereas an upward trend was observed for heavy use of marijuana in the 10 cities surveyed. Concerning the use of heroin, 12 students in a universe of over 15,000 reported having injected this drug.

## Discussion

Trends in drug use by student over the four surveys showed that, whereas 25% of the students had experimented with drugs (excluding alcohol and tobacco) at least once, 75% had not. There was a steep decline in percentage rates when analyzing lifetime use compared to heavy use. This is highly for preventive programs whether primarily for the 75% of students who do not use drugs or

secondary for those reporting lifetime use of any psychotropic drugs.

Lifetime use of alcohol and tobacco remained stable over the four surveys, although the percentages were always substantial, e.g., in 1997 15.0% of the students were frequent users of alcoholic drinks and 6.2% of tobacco. These numbers are far in excess of the usage of the other drugs and show that in Brazil the major public health problem concerning drug use involves legal drugs. Any prevention program must necessarily include these two substances.

As far as the other drugs are concerned, comparison of the four surveys shows an upward trend in frequent use (defined as more than six times per month) for many drugs in many cities. It is important to emphasize that the use of marijuana increased in the 10 cities surveyed. Furthermore, for the first time ever, the Porto Alegre data showed that lifetime use of marijuana moved into first place in front of inhalants, which were relegated to second position. Inhalants have traditionally been the most widely used drugs in lifetime use. In this respect, the Porto Alegre data resemble those reported in many studies conducted in other countries such as the United Kingdom, Denmark, France, Spain, Portugal and the United States (22,23). In an attempt to explain changing frequencies of the use of marijuana in terms of lifetime use and heavy use, one must understand the behavior of young people towards drugs in general, since until recently there were many taboos and prejudices attached to drugs. One of the hypotheses that can be raised to explain this increase in consumption is that young people may feel freer to admit to a habit that has always been relatively frequent despite not being reported in surveys. The media has been taking a less prejudiced approach to marijuana users and different segments of the population have been involved in broader discussion of making the use of marijuana non-criminal. Another hypothesis is that the authorities have

Table 6. Analysis of the frequency of frequent use of the five most used drugs among elementary and high school students in ten Brazilian capitals in 1987, 1989, 1993 and 1997.

Drugs	1987	1989	1993	1997	$\chi^2$ for trends
Inhalants	1.7	2.1	1.8	2.0	n.s.
Marijuana	0.4	0.5	0.6	1.7	↑ P < 0.01
Anxiolytics	0.7	0.8	0.6	1.4	↑ P < 0.01
Amphetamines	0.4	0.5	0.5	1.0	↑ P < 0.01
Cocaine	0.1	0.2	0.2	0.8	↑ P < 0.01
Total number of users*	2.7	3.5	3.0	3.2	n.s.
Alcohol	13.2	14.4	17.5	15.0	n.s.
Tobacco	7.0	7.4	6.6	6.2	n.s.

\*Excluding alcohol and tobacco.

n.s. = not significant; ↑ = significant increase (chi-square test for trends).

turned a blind eye to marijuana use, thus contributing to increased consumption. Reinforcing this idea are the reduced numbers of marijuana apprehensions by the Federal Police in recent years, in contrast to cocaine, for which apprehensions and hospital admissions have increased (24,25).

Cocaine use has also grown over the four surveys. Lifetime use of cocaine increased in eight cities (except Recife and Rio de Janeiro). There has also been an increase in frequent use in six cities (Belém, Belo Horizonte, Brasília, Porto Alegre, Salvador, and São Paulo). Heavy use (twenty times or more per month) showed an upward trend in four cities (Belo Horizonte, Brasília, Salvador and São Paulo). Although the final numbers are relatively small, lifetime use of cocaine in 1997 was reported by only 307 students (1.9% of the sample). However, this 1.9% rate of students reporting lifetime use is much higher than in countries such as Finland (0.2%), Sweden (0.6%), Greece (0.7%), Portugal (1.0%) or France (1.1%) (22). On the other hand, lifetime use of cocaine in Brazil is lower than in the United States, where the percentage is around 3% (23).

Regardless of these findings about the increased use of marijuana and cocaine, it is important to emphasize that the use of inhalants among students still remains an intractable problem and is sometimes overlooked and neglected. It is important to note that these drugs are potential causes of death, and some investigators have stated that use of inhalants is the gateway to the world of illegal drugs (15,26-29).

In general, reports indicate increased use of psychotropic drugs by males, particularly illicit drugs (15,30,31). In fact, an analysis of the four surveys clearly shows a distinct preference for marijuana and cocaine among males compared to women. Males are also less fearful of being in contact with crime. Women prefer to make use of drugs in the form of pills, such as anxiolytics and amphetamines. One possible hypothesis for this

result could be that females are brought up in a way that induces them to use these medications and are normally praised exclusively for their physical appearance. This "upbringing" is probably related to the attitudes of their mothers and society in general, which demands that women be "calm and skinny" (32). These observations on gender-related differences in preference should not be overlooked when devising an effective prevention plan.

Analysis of the four surveys on drug use according to the various age groups showed no increasing frequency of lifetime use for any of the age groups. However, the data for lifetime use in the 10-12-year-old age group show that almost 13% of the students had already had some experience with psychotropic drugs (not including alcohol and tobacco). This precocity may lead to a major risk of abusive use or even to future drug dependency. This is the period in their lives when teenagers are most vulnerable to drugs (33).

Although Brazil is a country of continental dimensions, no striking differences were observed concerning the use of drugs in general in the cities surveyed, which represent the five geographical regions. However, certain peculiarities were observed in some of the cities, probably due to local habits or to a larger supply of certain drugs. For this reason, the use of cocaine paste appeared only in Belém, with a meaningful percentage of 1.5% (13 students) and in Brasília, with 0.3% (6 students). Additionally, in Brasília there were 6 students who reported the use of "merla" which is another way of preparing and consuming cocaine (a type of crack made from cocaine paste). In the three cities in the Northeast (Fortaleza, Recife and Salvador) an upward trend in lifetime use was observed regarding the use of anticholinergic substances (mainly Trihexyphenidyl). These are the cities with the highest percentages of users of these drugs - 2% (34). This peculiarity of the Northeast region is also

seen in studies involving other segments of the population, such as street children (35). Another interesting regional aspect is the use of benzamide (an anti-inflammatory) and cycloplegic eye drops (eye drops with a benzydamine chlorhydrate base used by ophthalmologists to dilate pupils), which is abusively used nasally and presents anticholinergic effects. There is no control over the sale of these medications in this country. It is therefore important to take into account cultural peculiarities in the elaboration of programs of drug abuse prevention.

Note that almost 20% of the students mentioned knowing someone who used injectable drugs, although only 12 students reported having used heroine (0.07%). The media has overreacted to a hypothetical "explosion of heroin usage" in Brazil. This trend was not observed in the present statistical data. This raises the question of whether the media functions as a promoter, popularizing certain drugs. Nevertheless, the determination of whether or not heroin is present in our daily lives is a matter that must be looked into urgently.

Finally, another aspect of the results that should be emphasized was the discrepancy between student age groups and school years. Some studies have associated drug abuse with poor school performance, failure to pass to the next grade and dropping out (36,37). In Brazil the discrepancy between school year and student age is so significant that one cannot draw any conclusions as to whether drug abuse is related to it or not. Nevertheless, we may state that the elementary school system of this country is flawed in many aspects and has no appeal to the students, so that half of the total number of students are not in the school year corresponding to their age group.

When comparing the four studies the major conclusion is that there were significant increases in the lifetime use, frequent use and heavy use for many drugs. These results also indicate the need for more regular studies of this nature that will permit us to monitor drug use trends over the years and ensure the means of providing preventive measures which are adequate to our reality.

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