

A preliminary study on cognitive enhancer consumption behaviors and motives of French Medicine and Pharmacology students

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Abstract. – BACKGROUND: Pharmaceutical neuroenhancer consumption in college students is a rather unknown phenomenon in Europe and particularly in France, where surprisingly only one study was conducted in 1988.

AIM: Our objective is to assess prevalence and motivations for licit (use inside medical indication) and illicit pharmaceutical neuroenhancer consumption (tablet form) in a non-selected French sample of Medicine and Pharmacology students.

SUBJECTS AND METHODS: A validated questionnaire was sent to French sample of Medicine and Pharmacology students using email. The questionnaire investigate motives for use of pharmaceutical licit (vitamin C and caffeine tablets) and illicit (methylphenidate, amphetamines, modafinil, piracetam).

RESULTS: Among 206 undergraduate students, 139 students (67.4%) declared to have consumed at least one cognitive enhancer in the past 12 months. Twelve students (8.6% of cognitive enhancers users and 5.8% of our total sample) used illicit pharmaceutical neuroenhancer. The motivations were first to improve their academic performances, second to improve their wakefulness/vigilance, and third to improve their attention/concentration.

CONCLUSIONS: Neuroenhancement is a widespread means of using pharmaceutical drugs in French as well as in US college campuses. Despite some limitations, these preliminary results highlight the need to boost the interest of professionals for the neuroenhancement issue in French and European students.

Key Words:

Prescription stimulants, Illicit use, College students, Motives, Amphetamines, Methylphenidate, Route of administration.

Introduction

The term “neuroenhancement” refers to improvement in the cognitive, emotional and motivational functions of healthy individuals through, the use of drugs, which are called pharmaceutical neuroenhancers. Pharmaceutical neuroenhancers used outside medical indication (“illicit” use) have also been called “smart drugs”. Methylphenidate (MPH) is one of the most consumed smart drugs, especially in US college campuses, with a prevalence of 7 to 25%^{1,2}. Neuroenhancement is a popular topic, attracting attention both from the general public and the scientific research community. However, pharmaceutical neuroenhancer consumption in college students is a rather unknown and taboo phenomenon in Europe and particularly in France³, where surprisingly only one study was conducted in 1988⁴. At the time, 61.6% of the 172 medical students (aged 22 to 31 years) reported having used at least once in their lifetime a psychotropic drug, and 27.3% had used amphetamines or amphetamine-like molecules (including MPH) during exams or night shifts at the hospital. This consumption was significantly associated with the consumption of pharmaceutical vitamin C tablets.

Our objective is to assess prevalence and motivations for licit (use inside medical indication) and illicit pharmaceutical neuroenhancer consumption (tablet form) in a non-selected French sample of Medicine and Pharmacology students. This study is the first study that has been conducted in France on this subject in 25 years⁴.

Subjects and Methods

Our methodology was widely inspired from Teter et al study⁵ and McCabe et al⁶. A letter describing the study was sent to students using the email database of the French medicine and pharmacology student associations. They were invited to self-administer a confidential Web survey by using a URL address. The survey was conducted during the academic year 2012-2013.

Our questionnaire is a French translation of Teter et al's validated one⁵. Survey questions about motives for use of pharmaceutical licit (vitamin C and caffeine tablets) and illicit (MPH, amphetamines, modafinil and piracetam) neuroenhancers were not mutually exclusive (i.e., students could report more than one reason). Our survey items included both generic and brand names in order to increase clarity for respondents. However, we use generic names exclusively in our description of our findings.

Statistical Analysis

Data were analyzed using SPSS software (Version 18.0, StatSoft). Frequency of consumption and motives were compared between males and females, and between early (began in the first year of college or before) and later (after the first year of college) consumers, using chi-square tests. Effects were considered significant if the p value was equal to or less than .05.

Results

The final sample consisted in 206 undergraduate students in Medicine or Pharmacology. The sex ratio F/M was 58.3%, the mean age 21.04 ± 3.81 years, and there was 83.9% (173/206) of Medicine students.

Prevalence and Motives of Licit and Illicit Cognitive Enhancers Use

Overall, 139 students (67.4%) declared to have consumed at least one cognitive enhancer in the past 12 months. Overall, 89.0% (124/139) of cognitive enhancers use began in the first year of college or before, and 35.3% (49/139) reported having used these molecules more than 40 times in the past year. Of these 139 students, the majority consumed only over-the-counter licit tablets of vitamin C (84.8%, 118/139) and tablets of caf-

feine (71.9%, 100/139). The only gender difference was that females were found to consume significantly more vitamin C ($p = 0.013$).

The motivations of these 139 students were for 90.6% (125/139) to improve their academic performances, for 82.7% (114/139) to improve their wakefulness/vigilance, for 40.2% (55/139) to improve their attention/concentration. Among minor motivations, we found that 7.9% (11/139) wanted to try a novel experience, 5.0% (7/139) used cognitive enhancers also for recreational use (feeling of euphoria or correcting sedation induced by other recreational drugs). Students who began their consumption in the first year of medicine or pharmacy or before were more often motivated by attention/concentration enhancement ($p < 0.001$) and consumed significantly more frequently cognitive enhancers ($p = 0.011$) than students who began later.

Prevalence and Motives of Illicit Cognitive Enhancers Use

Twelve students (8.6% of cognitive enhancers users and 5.8% of our total sample) used smart drugs (MPH, amphetamines, and piracetam). None of the students reported receiving medication for a current illness except one student who declared to be treated by escitalopram for a major depressive episode. Seven were females (58.3%). Five (41.7%) reported having used these drugs more than 40 times in the past year. Among the smart drugs, MPH was the most frequently consumed smart drug (5/12, 41.7%). One third (4/12) used amphetamines, one third (4/12) used piracetam. Nobody declared the consumption of modafinil. So the smart drugs use prevalence in our sample can be detailed as follows: MPH 3.6%, amphetamine 2.9% and piracetam 2.9%.

The motivations of these 12 students were for all to improve their academic performances, for 75% (9/12) to improve their wakefulness/vigilance, for 41.6% (5/12) to improve their attention/concentration. One MPH user and one amphetamine user (1 male and 1 female) reported using respectively MPH and amphetamines for cognitive enhancement but also for weight loss. Seeking euphoria (emotional enhancement) was a motivation for 16.7% (2/12). One male used smart drugs (MPH) by snorting, which was associated with recreational use. All smart drug consumers began their consumption during the first year of Medicine/Pharmacy college or before.

Discussion

In view of these preliminary results, we can draw some important data. Firstly, a majority of students in medicine/pharmacy regularly consume licit pharmaceutical tablets of vitamin C and caffeine to boost their academic performance (90.6% of consumers), and in particular their wakefulness/vigilance (82.7%), this confirms Bailly et al previous findings in 1988⁴. The search of neuroenhancement is thus a widespread means of using pharmaceutical drugs in French as well as in US college campuses. The rarity of recreational use, which is not strictly a cognitive enhancement use, is in line with this interpretation.

Secondly, the number of (illicit) consumers of smart drugs (MPH, amphetamines, piracetam) in our sample is lower (5.8%) than in the French 1988 study (27.6%) and US studies (7-20%), but is not negligible. An important result is the reversal of sex ratio (37.8% in 1988 vs 58.3% in 2013), representative of the feminization of the medical profession in France⁷. As expected, MPH was the most frequently consumed smart drug in our sample. Amphetamine consumption decreased also dramatically probably due to strengthened legislation in France⁸. Snorting was marginal in our sample (one case) and associated with recreational use.

Moreover, all smart drug consumers began their consumption in the first year (or before) of Medicine/Pharmacy in our sample, which means that the product availability (in hospital for example) or the counseling with older students or mentors are not the principal risk factors of first exposure to the drug. Thus, this consumption does not seem to be specific to the medical area and we hope that this study will be replicated in other populations of students. However, our sample is very young (mean age 21 years) so it may be more representative of young students than old students, these results should be replicated in larger samples. We found that students who began smart drug consumption during the first year were more often seeking attention/concentration enhancement, which was expected given that the first year ends by a very selective exam (only approximately 10% of students are accepted in the second year).

There are several criticisms that need to be addressed regarding the present study. Firstly, the sample is quite small and we don't have the

response rate. Thus we don't know if our sample is representative of the whole class of Medicine and Pharmacy students in France. As in many cross-sectional prevalence studies, nonresponse may have introduced bias in our results^{5,6}. Some clues (age, sex ratio) indicate that our sample may be representative of the young French Medicine and Pharmacy students, but these preliminary results should be replicated in a further wider study. Secondly, this study explores only the use of pharmaceutical cognitive enhancers in tablet form, we did not explore tobacco smoking and coffee consumption, despite the fact that tobacco smoking and coffee were found to be associated with smart drugs consumption in Bailly et al study⁴. Thirdly, attention deficit/hyperactivity disorder, major depressive disorder and sleep disorders were not assessed either to determine which students may be self-medicating due to untreated psychiatric condition^{9,10}.

Despite these limitations, this is the first study on cognitive enhancers consumption and particularly smart drug consumption in a sample of French students in 25 years⁴. Moreover, we discriminated each molecule, which had not been done in the previous study⁴. We found a prevalence of 5.8% for smart drugs consumption in pharmacology and medical students, mostly in order to enhance academic performances and vigilance. Methylphenidate was the most frequently consumed molecules.

Conclusions

We hope that these preliminary results will boost the interest of professionals for the neuroenhancement issue in French and European students.

Conflict of Interest

The Authors declare that there are no conflicts of interest.

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