

Nonmedical Use of Prescription Drugs among Medical Students and the Relationship With Illicit Drug, Tobacco, and Alcohol Use

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ABSTRACT: Nonmedical use of prescription medications is a growing health problem including not only the opioid painkiller overdose epidemic but also benzodiazepine and stimulants misuse. Medical students express considerable high percentages of prescription drug misuse but also of illicit drug use, with cannabis being the frequently used illicit drug. We report the final results of a cross-sectional study among medical students that examined prevalence and motivation for use and suggest that medical students display similar patterns of misuse, for both licit and illicit drugs, to other students. Furthermore, a correlation was found between illicit drugs use with tranquilizers misuse and between smoking and alcohol misuse with opioids, sleeping drugs, and stimulants use. Considering that substance use during medical school affects students' personal and professional lives and has potential consequences for their patients, further studies are needed to elucidate the prevalence but also the motivation for that use.

KEYWORDS: Medical students, prevalence, nonmedical use of prescription drugs, illicit drugs, cannabis

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Nonmedical use of prescription medications (NUPM) is defined as the use of prescription drugs, whether obtained by prescription or otherwise, other than in the manner, for the reasons, or time period prescribed or by a person for whom the drug was not prescribed.¹ According to the United Nations office of drugs and crime, “the misuse of prescription drugs, including opioids, benzodiazepines and synthetic prescription stimulants, is a growing health problem in a number of developed and developing countries.” While prescription opioid misuse, characterized as “the painkiller overdose epidemic,” has attracted much of the public attention given to drug abuse and deaths, lethal overdose from benzodiazepines increased 7-fold in a short few years and prescriptions for amphetamines have skyrocketed.^{2,3}

Nonmedical use of prescription medications is most prevalent among adolescents and young adults⁴ and medical students are not the exception; they are at increased risk for both licit and illicit drug misuse.^{5,6} Medical education has been reported to be one of the most stressful academic curricula worldwide, negatively affecting the mental health of students.⁷ The study of substance abuse by medical students is important because the perception and detection of patients with substance abuse problems may be influenced by the personal experiences of physicians with substance abuse.⁸ Furthermore, to fully comprehend the risks associated with the misuse of prescription medications, it is necessary to understand the motivations of that use.

In a previously published cross-sectional study, we assessed the prevalence and motives of NUPM among medical students.⁹

Our population consisted of more than 3500 medical students from the second largest medical school in Greece. From a random sample of 1000 students, 591 (mean age was 21.7 years) completed a Web-based survey. The prevalence and motivation of use of 4 prescription drug classes were studied: opioid painkillers, tranquilizers, sleeping medication (short-acting tranquilizers, eg, temazepam, triazolam and Z-drugs, eg, zolpidem, zopiclone), and stimulants (methylphenidate). The prevalence of lifetime use was 10.7% for at least 1 of the 4 prescription drug classes, whereas about 9% misused multiple drug categories. The most frequently misused drugs were opioid painkillers (prevalence of lifetime misuse of 19.3%), followed by sleeping medication (14.7%), tranquilizers (7.3%), and stimulants (1.4%). The percentage of stimulants misuse in our sample was notably, but not surprisingly, low because the overall percentage of medically prescribed stimulants in Greece (only methylphenidate is available on the market) is also very low.

Motivation behind NUPM by medical students is rarely studied. In our sample, self-treatment was the most prevalent motivation for all prescription drug categories, ranging from 70.1% for sleeping medication to 95.6% for opioid painkillers. A considerable number of medical students also used tranquilizers (25.6%) and sleeping medications (29.9%) with a recreational or mixed intention. Tranquilizers misuse, expressed as lifetime and past-year prevalence, was significantly higher in the last 3 years of medical studies. Regarding motivation for use, self-treatment purposes were most prevalent in female students, whereas recreational use in male students. Our findings are consistent with previous findings on substance use among



medical students that highlighted 2 strongly associated factors: academic year and sex. Higher substance use rates were found during the last years of studies, whereas women had significantly higher misuse rates for hypnotic drugs (benzodiazepines and barbiturates).⁸

In a secondary analysis of the same sample (n = 591) of our medical students, we assessed the prevalence of illicit drugs, tobacco, and alcohol use.¹⁰ Cannabis was reported as the most frequently used illicit drug (22.2%), whereas the prevalence of use of other illicit drugs was much lower, about 1.5% to 3% for LSD, ecstasy, cocaine, amphetamine, shisha, ketamine, mephedrone, mushrooms, or inhalants and less than 0.5% for heroin, crack, and methadone. Recreational purposes were the most prevalent motivation of illicit drug use, being present in 87% of users. Concerning the use of alcohol and tobacco, most (80.4%) of the medical students were nonsmokers, 22.7% reported binge drinking and 6.4% were positively screened for potential alcohol abuse and dependence using the CAGE instrument. Smoking and binge drinking were found to be risk factors for illicit drug use, whereas no association was found with sex, age, study year, and CAGE.

An unpublished result of our findings among medical students is the association between NUPM and illicit drug use. Univariate and multivariate logistic regression models were used for the analysis and the 4 classes of prescription drugs were correlated with smoking, alcohol misuse (binge drinking—CAGE), and illicit drugs use (Table 1). According to the univariate analysis, (1) smoking was positively correlated with the misuse of opioids, sleeping drugs, and stimulants; (2) alcohol misuse with the misuse of sleeping drugs and stimulants; and (3) use of illicit drugs with the misuse of tranquilizers. In the multivariate analysis, we identified that smoking was individually associated with misuse of opioid painkillers (odds ratio [OR]: 2.17; 95% confidence interval [CI]: 1.36-3.45) and sleeping medication (OR: 1.75; 95% CI: 1.04-2.95), alcohol misuse was associated with misuse of sleeping medication (OR: 2.39; 95% CI: 1.13-5.06) and stimulants (OR: 10.14; 95% CI: 2.17-47.4), whereas use of illicit drugs was associated with misuse of tranquilizers (OR: 2.62; 95% CI: 1.392-4.95) (Table 1).

Our results suggest that about 1 in 10 medical students misused prescription drugs, mostly for self-treatment purposes and about 1 in 4 used illicit drugs, mostly for recreational purposes, with cannabis being the most frequently used. About 1 in 5 medical students were smokers and equal proportion displayed problematic alcohol use. Patterns of dependence on prescribed medication seem to be different from the abuse of illicit drugs. The former might be more prevalent in high functioning people with higher socioeconomic status and social support.¹¹ However, the association between misuse of illicit drugs and misuse of prescription drugs is not well studied, especially in the population of medical students. A Web-based survey on adolescents suggested that there are different subgroups of misuse of prescription drugs, with the largest subgroup (76.3%) having lower probabilities of using any other substance.

Table 1. Relationship between the use of tobacco, alcohol, and illicit drugs with the lifetime prevalence of prescription medications use.

	OPIOID PAINKILLERS		TRANQUILIZERS		SLEEPING MED		STIMULANTS	
	OR (95% CI) UNIVARIATE ANALYSIS	OR (95% CI) MULTIVARIATE ANALYSIS	OR (95% CI) UNIVARIATE ANALYSIS	OR (95% CI) MULTIVARIATE ANALYSIS	OR (95% CI) UNIVARIATE ANALYSIS	OR (95% CI) MULTIVARIATE ANALYSIS	OR (95% CI) UNIVARIATE ANALYSIS	OR (95% CI) MULTIVARIATE ANALYSIS
Smoking	2.166 (1.362-3.446)	2.166 (1.362-3.446)	1.872 (0.944-3.715)	—	1.830 (1.091-3.068)	1.748 (1.037-2.946)	12.900 (2.569-64.775)	4.541 (0.766-26.912)
Binge drinking	1.356 (0.850-2.163)	—	1.931 (0.999-3.734)	—	1.563 (0.942-2.592)	—	5.866 (1.383-24.872)	1.836 (0.365-9.233)
CAGE	0.941 (0.404-2.195)	—	2.053 (0.758-5.563)	—	2.557 (1.218-5.368)	2.391 (1.131-5.058)	16.147 (3.870-67.475)	10.138 (2.169-47.395)
Illicit drugs' use	0.879 (0.542-1.426)	—	2.624 (1.392-4.946)	2.624 (1.392-4.946)	1.276 (0.768-2.120)	—	22.360 (2.727-183.312)	8.814 (0.939-82.748)

Alcohol misuse was expressed as positive screening using the CAGE scale or binge drinking. The relationship was investigated with univariate analysis and multivariate logistic regression in terms of odds ratio (OR) and 95% confidence intervals (CI). **univariate analysis:** painkillers use was correlated with smoking (p=0.001), tranquilizers lifetime use with illicit drugs use (p=0.002), sleeping drugs use with smoking (p=0.021) and CAGE (p=0.011) and stimulants' use with binge drinking (p=0.007), smoking (p<0.001), illicit drugs' use (p<0.001) and CAGE (p<0.001). **multivariate analysis:** painkillers' use was correlated with smoking (p=0.001), tranquilizers lifetime use with illicit drugs' use (p=0.002), sleeping drugs' use with smoking (p=0.036) and CAGE (p=0.023) and stimulants' use with CAGE (p=0.003).

However, there was also a subgroup with considerable size (12.4%) displaying higher probabilities on using alcohol, tobacco, or cannabis.¹² A recent multinational study suggested that use of benzodiazepines or illicit drugs was associated with both misuse (OR: 4.36, 95% CI: 3.29-5.93) and abuse (OR: 6.49, 95% CI: 4.0-10.48) of prescription opioid painkillers.¹³ Illicit drug use among students was found significantly associated with other substance use, eg, daily smoking, heavy episodic drinking, and high CAGE test scores.¹⁴ Accordingly, a survey on 411 college students suggested that both use of illicit drugs and misuse of prescribed analgesics and stimulants were more common in heavy drinkers in comparison with moderate or light drinkers.¹⁵ Binge drinking and cannabis use are correlates of NUPM, whereas correlates of illicit drug use include binge drinking and cannabis use.¹⁶

Consequences of alcohol and drug use among medical students include interpersonal altercations, suicidal ideation, cognitive deficits, and compromised academic performance.¹⁷ Researchers also suggest that substance use in medical school may be the root of the ongoing problem of increased substance use in practicing physicians.^{6,18} Finally, we have to consider that recently published evidence supports that the transition from nonmedical use of prescription opioids to heroin use appears to be part of the progression of addiction in person with frequent nonmedical use and in those with prescription opioid abuse.⁴



In conclusion, our findings support the existing evidence that medical students misuse prescription drugs and cannabis, while we further noticed a correlation between illicit drugs use with tranquilizers misuse and also a correlation between smoking and alcohol misuse with opioids, sleeping drugs, and stimulants use. Considering that substance use during medical school affects students' personal and professional lives, further international studies are needed to elucidate the prevalence and the motivation of that use among medical students.

Author Contributions

GP conceptualized and designed the study and wrote the manuscript. IT analyzed and interpreted the data and drafted the initial manuscript. SS contributed to the study design and made the critical revision of the manuscript. All authors

reviewed and revised the manuscript, and approved the final manuscript as submitted.

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