

Use of Legal and Illegal Substances and Their Impact on the Academic Performance of Medical University Students

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ABSTRACT

Objective: This study will analyze the effects of the most common substances in medical students and their impact on their academic performance.

Method: 328 medical students were interviewed between April 2019 to March 2020 for this study. In this cross-sectional study, information regarding substance use habits among medical students was obtained through a survey.

The information was obtained through a questionnaire that is made up of 6 pages with the following sections: Registration, consumption of alcohol, marijuana, cocaine, medication to improve academic performance and energy drinks.

Results: The results in this investigation were the following: the use of alcohol showed that it has a low relevance in influencing the performance of the students ($p=0.702$), the use of marijuana showed that it has a low relevance in the performance ($p=0.527$), the use of cocaine showed that it has a low relevance in influencing academic performance ($p=0.560$), the use of medications showed that they have a high relevance in influencing academic performance ($p=0.001$), the use of energy drinks showed that they have a low relevance in influencing the performance of medical students ($p=0.346$).

Conclusions: The use of substances among university students has been increasing over the years, the importance of understanding this phenomenon and its repercussions on students can help prevent addictions, school dropouts and even deaths from overdoses, as described in various literatures.

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INTRODUCTION

Drug use and its effects on health and academic performance is a topic of interest in many spheres within the community. A problem is usually knowing how big the problem is. Over the years, the use of drugs and medications has become so common, more so in young people, even becoming an option for students when they study. Side effects that can lead to substance abuse, as well as damage to your behavior and mental health from abuse, have been documented. There has been so much concern about this problem that early detection and treatment programs have been created to reduce the

incidence of illness associated with the use of psychoactive substances. (1,2)

International reports carried out in schools indicate that up to 46% of students of both sexes consume substances of abuse. Alcohol, marijuana and inhalants are the substances most consumed by this age group; In addition, it is reported that up to 12% of these meet dependency criteria. (3)

However, in recent years, the consumption of psychoactive substances among young people has increased considerably. (4) The legal substances that present a greater presentation in consumption are alcohol and tobacco. Followed by cannabis

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and cocaine, the drugs with the highest prevalence of consumption among illegal drugs. (3.4).

Various reports indicate that young people between 13 and 25 years of age have greater vulnerability and risk of consuming substances of abuse because they are influenced by a complex interaction between various biopsychosocial aspects. For example, the neurobiological immaturity that implies that they are impulsive, and look for quick solutions to their problems related to the environment. (3)

As is known, medicine is a demanding career that demands hours of concentration, as well as reading when studying. But there are students who, at the time of this task, resort to substances such as drugs or medications thinking that these can help concentration, retention or understanding of the topics to be evaluated, as well as their general performance in exams.

Because the increase in the consumption of both legal and illegal substances has been increasing, and with it more side effects of these substances, it has been a problem of latent importance in society. (5)

With the completion of this research work, we seek to investigate more about how frequent this is among students, determine how effective the results obtained are, assess whether the repercussions of substance use have a benefit or in their place harm those who consume them. At least until the completion of this work, no similar studies have been found where different substances will be compared in the same study and their association with respect to the perception that students have about the effect on their academic performance.

OBJETIVE

This study will analyze how the substances consumed in medical students affect when studying or taking exams and see if they notice an improvement or a decrease in their academic performance compared to if they did not consume them.

MATERIALS AND METHODS

This is a cross-sectional study, 328 medical students were interviewed for this study. To maintain the privacy of the students, the information was obtained through an online questionnaire that is made up of 6 pages with the following sections: Registration, consumption of alcohol, marijuana, cocaine, medication to improve academic performance and energy drinks. In which they asked about:

Gender, semester you are currently studying, age, substance consumed (alcohol, marijuana, cocaine, medication to improve academic performance and energy drinks).

Then about each specific substance consumed by the respondent, in which they were asked, time of consumption, frequency, if there is an improvement or decrease in academic performance, if it has adverse effects and what they are. In topics related to marijuana, cocaine and tobacco, questions related to quantity were added. The characteristics of the surveyed population can be seen in Table 1.

Statistical analysis was processed through the "IBM SPSS STATISTICS V23" software, using Chi square tests for analysis.

Age (years)	(Mid+SD) 20.01 ± 3.84
Sex n(%)	
Male	159 (48.5%)
Female	169 (51.1%)
Semester n(%)	
1st Semester	50(15.2%)
2nd Semester	56 (17.1%)
3rd Semester	128 (39.0%)
4th Semester	77 (23.5%)
5th Semester	17 (5.2%)

Population and sample

The population taken into account were the university students who are studying medicine, which were approximately 2,237 students, of which a sample was taken only of the students from the first to the fifth year of medicine, the sample was 328 students, so the level confidence of the sample is 95% with an absolute error of 5% calculated with the Fisher formula. The selection of individuals was random through a survey that was sent to them through social networks, since this facilitated the condensation of information, dispersion, as well as the elaboration of graphs.

The substances surveyed were:

Alcoholic beverages: Alcoholic beverages today have become a way of life for the adolescent and adult population, so much so that it has spread normally over the general population. Alcoholism is the mental disorder with the highest lifetime prevalence in the United States of America. Alcoholism by itself is dangerous, but when combined with any other health disorder, it is one of the greatest factors of morbidity and mortality in the world today. (6)

Various surveys document that alcohol is the most consumed psychoactive drug in countries such as Spain, the United

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States, England, and New Zealand, among others. It has been established that a risk consumption for developing liver damage ranges between 60-80g/day for men and 20-40g/day for women for an average period of between 10 and 12 years. (6)

It has been documented that moderate but prolonged consumption in young people between 15 and 29 years of age is related to poor academic performance and even total school dropout. (7,8)

Alcohol has a biphasic effect on the human body, initially producing euphoria and relaxation that evolves into vision problems and coordination problems that can later produce more marked cardiovascular effects and even coma and death due to cardiovascular shock or inhibition of the central nervous system. breathing in the most severe cases. (6-8)

Marijuana: it is the most consumed illegal psychoactive substance worldwide, although in various parts of the world it is already beginning to be legalized. According to the WHO, in 2013 it was found that around 182 million people between the ages of 15-64 used it recreationally. (9-13) By 2016 that number had increased dramatically and more in people older than 12 years. The most common age group for the use of this substance is young adults over 26 years of age. (13)

Effects on academic performance

Marijuana use is considered a risk behavior due to the various effects it triggers in those who consume it. Specifically in students, consuming it can favor poor impulse control and low performance in the execution of tasks in which the inhibitory systems in the central nervous system are involved.(14,15) In addition to this, it negatively affects memory short and long term, work, verbal and visual; The learning; attention and psychomotor speed, having a greater effect in adolescents. (14,16) There are other investigations that confirm that there is a direct relationship between cannabis use and the development of risky, problematic, antisocial, violent behaviors that even culminate in physical aggression against third parties, and even non-compliance with the rules disciplines of educational institutions. (16) An investigation also found that cannabis use encourages the abusive use of alcohol, tobacco and other psychoactive substances in school-age consumers. (fifteen)

Cocaine: Benzoylmethylecgonine, also known simply as coca or cocaine, is a crystalline tropane alkaloid and a strong stimulant used mainly as a recreational drug, it is highly addictive and produces aberrant effects on the behavior of those who consume it. (17,18)

According to the national survey of health and drug use in the United States of 2013, it was reported that approximately 1.5 million people actively consume it, in addition to another survey it was determined that there are at least 15 million consumers in the world and this number over the years it has only increased. (17)

Neurostimulants.

Methylphenidate is mainly used for, mainly, the treatment of attention deficit. The use of substances among students not only has a direct impact on their academic life, but also on their social life, for which they resort to neurostimulants to compensate for the use of harmful substances. and thus achieve satisfactory results in the exams. (18)

Despite the fact that some guidelines have already established criteria for the diagnosis and treatment of this disorder (22), some students use their acquired knowledge to be able to self-medicate with this drug. This is dangerous, since potential risks of psychotic events, among other side effects, have been documented in patients who have been treated with this drug in a controlled manner. (18,20,21)

To cover the most common ones, a few of them are mentioned below.

Methylphenidate (Amphetamine):

Amphetamines increase the amount of synaptic dopamine, primarily by stimulating presynaptic activity rather than blocking reuptake, as occurs with cocaine. (22)

Methylphenidate is a central nervous system stimulant, directly derived from amphetamine. Its behavior is that of an indirect action sympathomimetic, which increases motor activity, alertness and decreases the feeling of fatigue. Due to its peripheral effect, it can produce vasoconstriction (with or without increased heart rate) and cardiac arrhythmias. It is used clinically in the treatment of attention deficit hyperactivity disorder (ADHD) in children, and in the treatment of narcolepsy. (22)

Modafinil:

Modafinil is a neurostimulant agent, approved in 1998 by the Food and Drug Administration (FDA) for the treatment of narcolepsy. Modafinil has shown various effects on physiology and behavior. (23)

It is possible that the cognitive benefits of modafinil depend on the underlying disorder to be treated, with marked improvement in wakefulness and speed of response when sleep disorders are treated. While better results are observed in memory and executive functions, when the disorders are due to dopaminergic dysfunction. In healthy sleep-deprived adults, modafinil counteracts cognitive impairments resulting from sleep loss. (23)

Energy Drinks: Energy drinks are a group of drinks with stimulating substances that are used by the consumer to reduce physical and mental fatigue. This group of drinks is mainly made up of glucose, caffeine, fructose and sucrose, which are what give that feeling of alertness. In addition, components such as preservatives (sodium benzoate) as well as colorants and flavorings can be included to make them more attractive. The most consumed worldwide of this group are: Red Bull, Monster, Volt among others, and at the Latin American level they are: Red Bull, Monster and Vive 100. (23)

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Table 2. Substances consumed in the student population.

Substance	Population that consumes it. n(%)
Alcohol	200 (60.98%)
Marijuana	89 (27.13%)
Cocaine	42 (12.8%)
Neurostimulants	77 (23.48%)
Energy drinks	206 (62.5%)

The consumption of these drinks has been seen mainly in young people between 13-35 years of age. In countries like the United States, 30% of young people have consumed this type of drink for different reasons. (24)

There are studies that show a high consumption of these drinks in medical students and athletes. The group of students mentioned that they consume them due to lack of energy, the need to be awake longer, to treat hangovers due to alcohol and to treat the effects of lack of sleep. (25)

Caffeine: Caffeine achieves its effect through its ability to antagonize adenosine receptors in a very competitive way, making it a drink widely consumed by students to stay active during study days and thus obtain better results.(23)

This will lead to a temporary increase in blood pressure that may be accompanied by cardiac manifestations. (23)

Taurine: Taurine has various effects at the cardiovascular and neurological level. Their effects such as increasing alertness and sleep inhibition make these drinks a very popular choice among students when studying for long periods without rest.(23)

By improving vascular endothelial dysfunction secondary to oxidative stress, it can improve cognitive performance. (23)

RESULTS

The results were divided in different ways, first, in the number of people who consumed the substances mentioned, which are shown in table 2.

Afterwards, it was divided by substances, as well as by their respective points asked on the form.

Table 3. Alcohol outcomes.

	When consuming it, do you feel any change?		Total
	Yes	No	
How long have you been NA consuming?			
less than 6 months	1	1	2
more than 6 months	16	14	30
Total	76	92	168
	93	107	200

The analysis of the use of alcohol showed that it has a low relevance in influencing the performance of medical students ($p=0.702$), finding that, of the 200 students evaluated, 107 (53.5%) did not perceive any change with respect to their performance academically, 66 (33%) noted a worse

performance, and 27 (13.5%) noted a better performance. Additionally, 170 (85%) had been consuming it for more than 6 months, while 30 (15%) had been consuming it for less than 6 months.

Table 4. Marihuana outcomes

	When consuming it, do you feel any change?		Total
	Si	No	
How long have you been NA consuming?			
less than 6 months	1	2	3
more than 6 months	15	12	27
Total	37	22	59
	53	36	89

The analysis of the use of marijuana showed that it has a low relevance in influencing the performance of medical students ($p=0.527$), finding that of the 89 students evaluated, 36 (40.4%) did not perceive any change with respect to their

performance academically, 22 (24.7%) noted a worse performance, and 31 (34.8%) noted a better performance.

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In addition to this, it was found that of the 89 students who use marijuana, 61 (68.5%) had been using it for more than 6 months, 28 (31.5%) had been using it for less than 6 months

Table 5. Cocaine outcomes

	When consuming it, do you feel any change?		Total
	Si	No	
How long have you been NA consuming?			
less than 6 months	1	0	1
more than 6 months	9	4	13
Total	23	5	28
	33	9	42

The analysis of the use of cocaine showed that it has a low relevance in influencing the performance of medical students ($p=0.560$), finding that of the 42 students evaluated, 9 (21.4%) did not notice changes in their performance, 24

(57.1%) note a worse performance and 9 (21.4%) note an improvement in their performance.

In addition to this, 19 (69.1%) had been consuming it for more than 6 months, while 13 (28%) had been consuming it for less than 6 months.

Table 6. Neurostimulants outcomes

	When consuming it, do you feel any change?		Total
	Si	No	
How long have you been NA consuming?			
less than 6 months	0	3	3
more than 6 months	24	3	27
Total	45	2	47
	69	8	77

The analysis of the use of medications (neurostimulants) showed that they have a high relevance in influencing the performance of medical students ($p=0.001$), finding that of the 77 students evaluated, 8 (10.4%) did not perceive any change with respect to their academic performance, 12 (15.6%) noted a worse performance, and 57 (74%) noted a better performance.

In addition to this, it was found that of the 77 students who consume neurostimulants, 39 (50.6%) consume

methylphenidate, 10 (13%) consume unspecified amphetamines, 9 (11.7%) consume dextroamphetamine and 19 (24.7%) consume some other neurostimulant. .

35 (45.5%) consume it by medical prescription and 42 (54.5%) consume it without such description.

48 (63%) had been consuming neurostimulants for more than 6 months, 29 (37%) had been taking less than 6 months.

Table 7. Energy drinks outcomes

	When consuming it, do you feel any change?		Total
	Si	No	
How long have you been NA consuming?			
less than 6 months	2	2	4
more than 6 months	24	14	38
Total	119	45	164
	145	61	206

The analysis of the use of energy drinks showed that they have a low relevance in influencing the performance of medical students ($p=0.346$), finding that of the 206 students evaluated, 61 (29.6%) did not perceive any change with

respect to their performance academically, 7 (3.4%) noted worse performance, and 138 (67%) noted better performance. 168 (81.5%) had been consuming these drinks for more than 6 months, 38 (18.4%) had been consuming them for less than 6 months.

DISCUSSION

This research showed that academic performance in students is influenced depending on the substance consumed, as well as the time they have been doing it, including the moment of consumption start with respect to exams. In the case of alcohol, our research showed us that the majority of people who consume it did not notice any change in their academic results, and based on the people who did notice a change in their grades; there was a change in 15.5% of the people interviewed who worsened in their academic activities and there was 8.3% of the people interviewed who improved in their academic activities; Based on works such as Tiburcio et al, they mention a worsening in the academic life of people who consume alcohol on a regular basis, not only the final results are taken into account but everything that implies having a lower performance in school, from tasks completed up to days not attended school linked to alcohol consumption, even so the greatest comparison is always according to the GPA (for its acronym in English "Grade Point Average") which facilitates the conclusion of the data ; If we take into account that the results obtained by our research in the students who did notice changes in their academic performance and the results of the bibliographies, we can observe that there is consistency since the majority of these students felt a decline in their grades with respect to the alcohol consumption.(2)

In marijuana, it was consumed by 64 of the 328 students surveyed, which corresponds to 22.6%, it is a drug that is usually consumed in leisure time but its use for other purposes has increased. So much so that 34.8% of those who consume it have noticed an improvement when using it to study and despite the fact that 40.4% have not noticed changes in their performance, having a negative impact of only 24.7% of those surveyed. This is contradicted by various articles (3) which explain how the chronic use of marijuana markedly affects the ability to retain information, as well as changes in the hippocampus due to the stimulation of TCH receptors. The fact that people do not notice changes or even see their performance improve may be due to the short time they have been consuming it, meaning that they do not notice a clear impact on their academic performance.

In cocaine, it resulted from the investigation of the sample of 328 students, chosen by 31 of them, representing 11%; which is commonly a recreational drug but it is seen that some people, as in the case of these respondents, use it when studying. Although 21.4% of them have noticed an improvement in their academic performance and the other 21.4% have not noticed any improvement, 57.2% have noticed a decrease in academic performance; this can be related to the fact that 47.6% do not know the amount in grams that they consume, and 11.9% consume more than 201mg, therefore this can be associated with an increase in dependence and excessive consumption of the substance in question, thus leading to an addiction, as mentioned in other works (15).

In medications to improve performance, it was shown that medications to improve academic performance have been selected by 77 students, representing a percentage of 23.48% of all the surveys carried out.

Modafinil improves alertness similar to sympathomimetic agents including amphetamines and methylphenidate. Most of the consumption of these medications is self-medicated, presenting a percentage of 54.5%, making the doses less controlled, and therefore the adverse effects are more commonly presented. 48.1% consume any of the aforementioned medications just before taking an exam, implying that their use is merely for their effect to keep people awake and not for their desired effect. It seems that despite being students in the health area, they are willing to harm it in order to improve their school grades.

In energy drinks there was a very high percentage that noted improvement in academic performance with 67% of the 206 people, which is more than half of those surveyed. This is because, physiologically, substances such as caffeine act by increasing alertness, reducing sleep, which allows longer study time without fatigue. It also causes vasoconstriction, causing hyperactivity, which is what most people experience when consuming it. These drinks also increase the reuptake of information and the cognitive level, which also influences the improvement that was noted at the academic level.

In the international bibliography, there is not much evidence on the effects of these substances on students in the health area, as well as long-term consequences that may develop Substance use among medical students has become increasingly important over the years. Whether used recreationally or for study purposes, substance abuse can have a highly variable impact on students depending on many things, whether it's how long they use it, the timing of drug testing, and the dose of the same. Although the results of this research were not very clear, a study with a larger population is needed to clearly evaluate the effects of these substances in the student population.

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