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Exams-related stress and the pattern of substance use and misuse among Palestinian medical and health sciences students

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Received: 20 August 2023 / Accepted: 7 November 2023
Published online: 13 November 2023

Abstract
Substance use among school students is a public health concern. Exam-related anxiety is one of the main motives for drug use. This research aimed to determine the prevalence and characteristics of psychostimulant and antidepressants use and misuse among medical and health sciences students at two large representative medical schools in West Bank Palestine. The results of a cross-sectional study, that surveyed 984 Palestinian medical and health sciences students revealed how educational experiences and newfound independence affect substance use behaviors among Palestinian medical and health sciences students. In total, 7.7% of the students reported using illicit drugs. Hallucinogens were the most commonly used drugs (2.9%), followed by central nervous system (CNS) stimulants (2.4%) and CNS depressants (1.4%), while 4.4% were using nonprescribed antidepressants, with Fluoxetine being the most used. Most drug users (72.4%) started using before they enrolled in university, and 39.5% did not realize the potential harm of these drugs. Medical students tend to use these substances less frequently than their non-medical peers. The study indicated that exam-related stress was a crucial factor in the prevalence of drug use and misuse. Peer pressure, academic, psychological, and family pressures were other primary reasons behind drug use. The study's results indicated that the misuse of antidepressant medications and other licit and illicit substances is highly prevalent among Palestinian medical and non-medical students. The results also underscore the importance of raising awareness about drug use and providing students with accurate information about the safe use of these substances.

Keywords CNS antidepressants · CNS stimulants · Drug use and misuse · Hallucinogens · Recreational drugs · Fluoxetine

1 Introduction

Using drugs to enhance cognitive abilities among healthy individuals is referred to as pharmaceutical cognitive enhancement [1]. With the highest prevalence of stimulant use worldwide over the last years, young adults are more likely to use illicit drugs like stimulants, which can have serious consequences such as hallucinations, anxiety, loss of appetite, and even death [2].

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The most commonly used stimulant medications are Ritalin (methylphenidate) and Adderall (dextroamphetamine) [3–5]. These prescription stimulants have positively affected mood, memory, concentration, intellectual capacity, and wakefulness [6]. However, amphetamine and methamphetamine are illegal drugs abused globally due to their euphoric and stimulant effects [7]. The use of amphetamine can lead to behavioral changes, including increased arousal, anorexia, hyperactivity, perseverative movements, and a pleasurable affect, elation, and euphoria, which may result in drug abuse [8].

Substance use among school students is a public health concern, as it can significantly impact the health and well-being of individuals, families, and communities. As a medical student, the academic lifestyle is marked by long periods of staying alert and facing constant exams. This lifestyle can lead to high-stress levels, which prompts students to seek ways to boost their cognitive abilities, increase efficiency, and improve concentration levels for studying, taking tests, and meeting academic demands [9]. This inclination has led some students to use stimulant drugs without a prescription [10]. Moreover, as medical students know about the mechanism of action of these stimulants, they are more likely to use them [11]. Additionally, medical students are more vulnerable to depression and suicidal ideation than the general population [12]. Understanding why students use these stimulants and antidepressants can provide valuable insights into their mental health needs and coping mechanisms, leading to tailored mental health interventions and support services, reducing stigma, and informed research and policy efforts focused on mental health in medical education.

Studying drug use among college students involves monitoring their drug use habits before and after enrolling in college. This helps researchers determine drug use patterns and can reveal how educational experiences and newfound independence affect substance use behaviors. It is important to understand these patterns to develop effective prevention and intervention strategies that can help students make healthy choices and avoid the negative consequences of drug use. By examining the factors that influence drug use among college students, we can better understand their challenges and work to create a safer and healthier campus environment.

Exam-related anxiety is one of the main motives for drug use. Examining substance use both before and during exams can provide valuable insights into patterns and trends among students and establish a baseline measurement of usage patterns under normal conditions. This examination can also help identify individuals at higher risk for negative consequences such as mental health disorders, addiction, delinquency, and premature sexual activity, demanding attention and customized interventions. By evaluating substance use among school students, we can develop strategies to tackle the unique challenges presented during high-stress exam periods, potentially reducing harmful substance use behavior [13, 14].

The issue of drug use and misuse among young adults in Palestine is of great concern and requires our immediate attention. It has a significant impact on their physical health, social relationships, and mental well-being. Recent studies indicate that a worrying number of Palestinian teenagers and young adults are resorting to cognitive enhancers and psychostimulants [10, 15–20]. Of particular concern is the growing trend among medical students who appear to be more susceptible to using these substances to enhance their cognitive abilities. Substance abuse and misuse among medical and health sciences students can harm their physical, mental health, professional, and moral character. Several indicators must be reviewed to understand the scope of the drug use issue among these students. Studies to address this problem are needed. This research aimed to determine the prevalence and characteristics of psychostimulant and antidepressants use among medical and health sciences students at two large representative medical schools in West Bank Palestine. Specific objectives were to determine the types, patterns, knowledge, and motivations of stimulant and antidepressant medications usage among medical students before and during exams and to determine the side effects of their use.

2 Methods

2.1 Study design, setting, and sampling

A cross-sectional study was conducted in the West Bank of Palestine in 2023. The study targeted undergraduate students (N = 14,500) pursuing basic and clinical medical education and other health sciences from two major universities: one in the north and the other in the south of the West Bank. The required sample size for the study was determined to be 365 students from each university, based on an estimated 50% proportion of psychostimulant use among university students, with a 95% confidence level and 5% precision. The sample size was increased by 20% to accommodate incomplete questionnaires, resulting in a final sample size 984. Stratified sampling was implemented for the two faculties of medicine and health sciences, with stratification based on the university and academic year. Random sampling from each academic year proved difficult, so a convenience sampling technique was used to select participants. We invited undergraduate basic and clinical medical students, as well as other health science students,

aged between 18 and 26 years, and attending the faculties of Medicine and Health Sciences in the target universities in West Bank, Palestine. The invitation was sent through flyers, portal invitations, and social media platforms such as student webpages and groups. Students were informed about the study, including a detailed explanation of the research's aims and objectives, requirements, and ethical considerations. Students who declined to provide informed consent, those who participated in the pilot study, or those who did not complete the questionnaire were excluded from the study.

2.2 A research tool, validity, and reliability

A self-reported questionnaire consisting of eight sections was utilized. The questionnaire consisted of eight sections. The first section of the questionnaire was the background and sociodemographic data. In the second section of the survey, questions related to the use of each licit and illicit substance in relation to college enrolment. The options were divided into five categories: I have used it both currently and in the past before enrolling in college, I did not use it before, and I used it after enrolling in college, I stopped using it before I enrolled in college, or I stopped using it after enrolling to college, and had not used it at all in my life. The third section asked about the rate of licit and illicit substances use during exams and categorized into four choices: the usage rate increases during exams, the usage rate remains the same, I use it only during the exam, or I use it before, but I stop during exams. The fourth section asked about the motives and pressure to use licit and illicit substances, such as from family, friends, and classmates, through my studies, school, university, website, and prescription. The fifth section asked about the most common types of antidepressant medications and their use pattern. The use pattern is categorized into five choices: I had never used it, I currently use it, I used it before and stopped, I use it sporadically, or I only used it as an experiment. The sixth section asked yes or no questions about the knowledge and attitude of antidepressant medication use. The seventh section asked yes or no questions about the side effects of antidepressant use. The eighth section asked about the motivations of antidepressant medication use. The questionnaire was constructed based on previously used questionnaire [18, 19]. The researcher created the questionnaire, reviewed by experts, and refined it through a pilot study (n = 30) to ensure accurate and valid results and the time required to finish it. The questionnaire was revised and re-tested. The reliability (Cronbach's Alpha) of the motives for illicit drug use and antidepressant use, knowledge and attitudes toward antidepressant use, were found to be 0.924, 0.824, 0.651, respectively, which are considered reliable [21].

2.3 Study variables and operational definitions

Antidepressant medications: The families involved are selective serotonin reuptake inhibitors (SSRIs), tricyclic antidepressants (TCA), and serotonin-norepinephrine reuptake inhibitors (SNRIs)[22]. "recreational drugs" refers to legal and illegal chemical substances consumed without medical supervision for their mood-enhancing or other non-medical effects[23]. This category includes cannabis, marijuana, hydro, Lysergic acid diethylamide (LSD), captagon, N, N-Dimethyltryptamine (DMT), Lyrica, and tramadol. Licit substances: included tobacco smoking (cigarettes, hookah or waterpipe, and vape), energy drinks, coffee, and tea. Illicit drugs included hallucinogens which included LSD and N, N-Dimethyltryptamine (DMT), cannabinoid marijuana, synthetic cannabis (hydro, K2, Mr nice guy, joker), central nervous system stimulants, CNS stimulants, which included methylphenidate, dextroamphetamine, methylphenidathydrochloride, and captagon and central nervous system suppressors which included lyrica, tramadol, and alcohol.

A current substance user is a student who uses or consumes any psychoactive substance regularly, regardless of the frequency or amount of use. This can include both licit and illicit substances. Typically, a person is considered a current substance user if they have used it within the past 30 days. Lifetime users are students who tried any of these substances at least once.

2.4 Data analysis

All analyses were performed using IBM SPSS Statistics for Mac, version 26 (IBM Corp., Armonk, NY, USA). Shapiro–Wilk test was used to test the normality of continuous variables distribution. Standard univariate statistics were used to

characterize the sample. Age was described using mean and standard deviation. Categorical variables were described using percentages.

2.5 Ethical approval

The institutional review board (IRB) at An-Najah National University approved [Approval number: Ref: Med. Sep 2022/7]. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all participants for being included in the study.

3 Results

3.1 Sociodemographic data

Medical students (N = 1356) were recruited; 338 refused to participate, 1018 answered the questionnaire, and 34 were excluded as they had incomplete answers. The final sample size was 984 participants. The mean age ± standard deviation was 20.8 ± 1.8; 60.3% were females, 55.1% were city residents, 23.2% were sophomores, 74.2% were medical students, 96.2% were single, 57.9% lived with their parents, and 12.4% work during school time (Table 1).

3.2 Licit substance use

The usage patterns, motives, and frequency of licit substances before and during exams are displayed in Table 2. Of all the participants, 13.4% were cigarette smokers, and 8.2% began smoking before college enrolment. Furthermore, 19.8% smoked hookah, with 13.3% starting before college enrolment, and 13.1% vaped, with 6.1% starting before college enrolment. Most participants (70.1%) drank coffee, with 55% starting before college enrolment, and 84.9% drinking tea, with 80.8% starting before college enrolment. A small percentage (2.6%) reported drinking alcohol, with 2.2% starting before college enrolment.

Peer pressure was cited as the primary reason for cigarette (64.2%), hookah (57.3%), vape (60.8%), energy drink (47.9%), and alcohol (50%) use. Conversely, coffee (71.9%) and tea (83.1%) users stated that their families were the primary motivators for their consumption. During exam periods, cigarette use increased by 8.8%, vape usage by 6.6%, energy drink

Table 1 Sociodemographic data of the participants (n = 984)

	Variable	n (%)
Gender	Male	391 (39.7)
	Female	593 (60.3)
Place of residence	City	542 (55.2)
	Village	407 (41.5)
	Camp	32 (3.3)
Study field	Medicine	730 (74.2)
	Biomedical and health sciences	254 (25.8)
Marital status	Single	947 (96.2)
	Married	37 (3.8)
Living place	Live in dorms	410 (41.8)
	Living with parents	570 (58.2)
Occupation	Work	122 (12.4)
	No work	860 (87.6)
Chronic diseases	No	962 (98)
	Yes	20 (2.0)

Table 2 The pattern, motivation, and rate of use of licit substances before and during exams

		Cigarettes	Hookah	Vape	Energy drinks	Coffee	Tea	Alcohol
Practice-based on college enrolment	I used it before and after college enrolment	81 (8.2)	131 (13.3)	60 (6.1)	292 (29.7)	541 (55)	795 (80.8)	22 (2.2)
	I used it after I enrolled	51 (5.2)	64 (6.5)	69 (7)	117 (11.9)	149 (15.1)	40 (4.1)	4 (0.4)
	I stopped using it after I enrolled	11 (1.1)	15 (1.5)	12 (1.2)	16 (1.6)	6 (0.6)	4 (0.4)	3 (0.3)
	I stopped using it before school	12 (1.2)	24 (2.4)	12 (1.2)	24 (2.4)	7 (0.7)	9 (0.9)	4 (0.4)
	Never used it	829 (84.2)	750 (76.2)	830 (84.4)	535 (54.4)	281 (28.6)	136 (13.8)	951 (96.6)
Motivation of use	Friend	102 (64.2)	134 (57.3)	96 (60.8)	214 (47.9)	108 (15)	106 (12.2)	20 (50)
	Classmate	20 (12.6)	26 (11.1)	26 (16.5)	42 (9.4)	31 (4.3)	26 (3)	4 (10)
	Family	13 (8.2)	52 (22.2)	15 (9.5)	89 (19.9)	517 (71.9)	720 (83.1)	10 (25)
	School	15 (9.4)	13 (5.6)	5 (3.2)	49 (11)	13 (1.8)	9 (1.0)	3 (7.5)
	University	9 (5.7)	9 (3.8)	15 (9.2)	52 (11.6)	50 (7)	5 (0.6)	3 (7.5)
	Others	0 (0)	0 (0)	1 (0.6)	1 (0.2)	0 (0)	0 (0)	0 (0)
Rate of use during exams	Increases	87 (8.8)	71 (7.2)	65 (6.6)	223 (22.7)	478 (48.6)	391 (39.7)	11 (1.1)
	Stays the same	35 (3.6)	98 (10)	45 (4.6)	129 (13.1)	162 (16.5)	404 (41.1)	10 (1)
	I use it only during exams	11 (1.1)	6 (0.6)	4 (0.4)	45 (4.6)	50 (5.1)	19 (1.9)	2 (0.2)
	I used it before, but I stopped during the exams	11 (1.1)	26 (2.6)	19 (1.9)	23 (2.3)	8 (0.8)	10 (1.0)	6 (0.6)

consumption by 22.7%, coffee intake by 48.6%, and alcohol consumption by 1.1%. However, the rate of hookah use remained at 10%, and tea consumption remained at 41.1% (Table 2).

3.3 Illicit substance use

Out of the total number of students, 7.3% were current illicit drug users, and 7.7% reported using such substances in their life. Of these, 11.8% were males, and 3.04% were females. Moreover, 72.4% of users began using these substances before and still use them during college, and 22.4% started after enrolment. Furthermore, 31.6% of users reported using multiple substances. When it comes to learning about these substances, 50% said they learned from friends, 14% from class, and 11.2% had various reasons for using them. The most commonly used substances were hallucinogens [2.9%; (5.1% males, 1.5% females)], followed by CNS stimulants [2.4%; (3.6% males, 1.7% females)] and CNS depressants [1.4%; (2.3% males, 0.8% females)]. (Table 3).

3.4 Patterns, motivation, knowledge, attitude, and side effects of antidepressants

The main reasons reported for using antidepressants were exposure to high-pressure situations (58.1%), reducing feelings of anxiety during exam periods (46.5%), reducing the feeling of extreme fatigue or exhaustion while studying for the exam (41.9%), and reducing the feeling of tension during the study (41.9%). Moreover, 32.6% of users became familiar with antidepressants during their university studies, and just 37.2% intended to consult a doctor. However, 60.5% of users intended to stop using antidepressants. In terms of knowledge, 58.1% read about antidepressants, 39.5% were not aware of their harmful effects, and 48.8% felt a need to use them. The most experienced side effects among users were sleep problems (30.2%), fatigue (27.9%), nausea (25.6%), stomach pain after taking the medicine (25.6%), and change in appetite after using the medicine (25.6%) (Table 4).

4 Discussion

Studying drug use among college students involves monitoring their drug use habits before and after enrolling in college. It aids in comprehending the impact of academic experiences and newfound independence on drug use behaviors [24].The research findings are alarming as many medical students have acknowledged the use of both legal and illegal substances before commencing their university studies. The study highlights that a high percentage of participants, about 7.7%, have admitted to using illicit drugs, with a more significant proportion of misuse of prescribed drugs than recreational drugs. Compared to students of other nationalities, the use of illicit drugs among medical and health sciences students in this study was relatively low. However, it is essential to note that there is a religious, social, and cultural stigma associated with illicit drug use in Palestine, which may contribute to a relatively high prevalence [16]. Moreover, the results demonstrate that the prevalence of recreational drug use among medical and health sciences students was relatively high at 3.9% compared to previous studies conducted among Palestinian university students, which reported a rate of 3.0% [19]. Unfortunately, recreational drug use among students occurred mainly due to peer pressure. Moreover, around one-third of the drug users were multiple drug users, emphasizing the growing concern about illicit drug use among Palestinian university students. These findings align with prior research showing that most Palestinian drug users consume multiple drugs, which increases their vulnerability to health issues compared to those who use only one drug [16]. Furthermore, a significant number of university students participate in energy drinks intake and tobacco smoking, including cigarettes, hookah, and vape, which aligns with previous research [15–19, 25–29]. This behavior tends to start at a young age, with many individuals experimenting with these substances before enrolling in university.

The prevalence of hallucinogenic drugs among the students in this study was 2.9%. DMT was the most frequently used drug, with a prevalence of 1.62%, followed by hashish (1.32%) and marijuana (1.32%). This prevalence is consistent with the general Palestinian population [30], indicating that using hallucinogenic drugs such as cannabis and LSD is a general problem in the West Bank. This could be attributed to several factors, such as political situation, stress, and financial constraints, for fun and entertainment and to reduce boredom [10]. This is the first study that detected DMT use in the West Bank. The lack of studies on DMT use in Palestine is a constraint to detecting its use, which could be attributed to legal and cultural considerations and restrictions on the production, importation, or access to DMT. Therefore, this void in our understanding impairs our capacity to tackle the problem holistically and assess its repercussions on individuals

Table 3 The prevalence and pattern of illicit substance use

		Total n(%)	Out of drug users (%)
Drug use	Total life users	76 (7.7)	100
	Males	46 (11.8)	60.5
	Females	30 (3.04)	39.5
	Multi-drug use	24 (2.4)	31.6
	Single drug use	52 (5.3)	68.4
	Multi-drug use among males	17 (4.4)	37.0
	Multi-drug use among females	7 (1.18)	23.3
	Recreational drugs	39 (3.96)	51.32
	Multi-recreational drug use	24 (2.4)	61.5
	Single recreational b use	15 (1.5)	38.5
Practice-based on college enrolment	I use the substances/s before and after college enrolment	55 (5.6)	72.4
	I use the substances/s after college enrolment	17 (1.7)	22.4
	I stopped before college enrolment	2 (0.2)	2.6
	I stopped after college enrolment	2 (0.2)	2.6
Hallucinogens use	Total	29 (2.9)	38.2
	Males	20 (5.1)	43.5
	Females	9 (1.5)	30.0
	Hashish	13 (1.32)	17.1
	Marijuana	13 (1.32)	17.1
	Hydro (grass)	8 (0.81)	10.5
	LSD	7 (0.71)	9.2
	DMT	16 (1.62)	21.05
CNS stimulants use	Total	24 (2.4)	31.6
	Males	14 (3.6)	30.4
	Females	10 (1.7)	33.3
	Dextroamphetamine	16 (1.62)	21.05
	Methylphenidate	18 (1.82)	23.6
	Methylphenidathydrochloride	9 (0.91)	11.8
	Captagon	4 (0.4)	5.2
CNS depressants use	Total	14 (1.4)	18.4
	Males	9 (2.3)	19.57
	Females	5 (0.8)	13.33
	Lyrica	6 (0.6)	7.8
	Trammal	8 (0.81)	10.5
How did you learn about the drug?	Friend		18 (50)
	Family		3 (8.3)
	Through class		5 (14.0)
	Previous prescription		3 (8.3)
	More than one method		4 (11.2)

CNS central nervous system, *LSD* lysergic acid diethylamide, *DMT* dimethyltryptamine

and society. Further investigations are needed to understand the increased prevalence of hallucinogenic drugs among medical students and Palestinians.

The prevalence of CNS stimulants among medical students was 2.4%, similar to that reported to Palestinian youth in the West Bank [10]. However, it is lower than what was reported in a systematic review and meta-analysis of 38 observational studies (8.8%) [31] and in a literature review conducted on medical students in various countries [32], and in United States (20%) and Saudi Arabia medical schools (5.8%) [33, 34]. One possible reason for the lower usage rate of

Table 4 Pattern, motivation, knowledge, attitude, and side effects of antidepressants

Questionnaire part		Among drug users n (%)
Antidepressant use	Total	43 (100)
	TCA	12 (1.22)
	SSRI	32 (3.25)
	SNRI	3 (0.30)
	None prescribed antidepressants	24 (2.44)
Motivation for use	(1) High competition for academic performance among college students	11 (25.6)
	(2) To stay awake for long periods during the night	13 (30.2)
	(3) They help to study for long hours	14 (32.6)
	(4) Increase concentration during the exam	16 (37.2)
	(5) They reduce the feeling of extreme tiredness or exhaustion during exam submission	17 (39.5)
	(6) They reduce the feeling of extreme fatigue or exhaustion while studying for the exam	18 (41.9)
	(7) They reduce the feeling of tension during the study	18 (41.9)
	(8) Reduce the feeling of anxiety during the examination period	20 (46.5)
	(9) Exposure to high psychological, academic, or family pressures, etc	25 (58.1)
Knowledge and attitudes (Answer Yes)	(1) Would you take one of these substances based on the advice of your colleague or friend?	11 (25.6)
	(2) Did you get acquainted with these materials through the internet?	5 (11.6)
	(3) Did you become acquainted with these materials throughout your studies at the university for one of the courses?	14 (32.6)
	(4) Do you take these medicines based on a prescription?	19 (44.2)
	(5) Do you intend to go to the doctor to consult him about your usage of these medicines?	16 (37.2)
	(6) Do you intend to stop taking it?	26 (60.5)
	(7) Do you intend to continue using it?	17 (39.5)
	(8) Did you read about it?	25 (58.1)
	(9) Do you know its harm?	26 (60.5)
	(10) Did you use these drugs before entering the university?	17 (39.5)
	(11) If you are not using it, do you intend to use it?	9 (20.9)
	(12) If you are not using it, do you feel you need one of these medicines?	21 (48.8)
Side effects of their use	(1) Did you gain weight after taking the medication?	1 (2.3)
	(2) Did you lose weight after taking the medication?	7 (16.3)
	(3) Do you feel tired or exhausted during the day?	12 (27.9)
	(4) Did you feel you suffered from constant stomach pain after taking the medicine?	11 (25.6)
	(5) Did you feel a constant headache after taking the medicine?	7 (16.3)
	(6) Has your appetite changed after using the medicine?	11 (25.6)
	(7) Did you feel any change in sexual desire (activity)?	10 (23.3)
	(8) Did you feel any nausea?	11 (25.6)
	(9) Did you feel your heart racing?	4 (9.3)
	(10) Did you suffer from constipation or diarrhea after taking the medicine?	6 (14)
	(11) Did you suffer from sweating after taking the medicine?	2 (4.7)
	(12) Did you suffer from a feeling of malaise, hopelessness, or depression after taking the medicine?	4 (9.3)
	(13) Did you struggle to fall asleep, stay asleep, or sleep too much?	13 (30.2)

CNS stimulants is the insufficient reporting of their use. In light of this, it is necessary to implement improved systems and policies to regulate and monitor the use of these substances.

According to this research, most students who used licit and illicit drugs started before entering universities. Peer pressure is identified as the main reason for drug use, which is consistent with other local and international studies [10, 19, 25, 35–38]. The abuse of drugs among friends and peers is believed to influence the behavior of adolescents [39, 40]. The findings demonstrate that drug use is a pressing issue nationwide among adolescents and young adults. This

underscores the urgent need for more stringent regulations and policies to curb the use of these substances, particularly in areas with a stigma attached to their use.

According to the findings of the study, medical students tend to use these substances less frequently than their non-medical peers, which aligns with previous local and national studies [18, 41, 42] as well as the general Palestinian population [43, 44]. Additionally, around two percent of students who previously used these substances stopped after university enrollment. This could be due to heightened awareness among medical students regarding the potential health risks associated with such substances. However, the use of these substances is becoming an increasing problem among both medical and non-medical university students in Palestine, despite the fact that studies have shown a lower prevalence of use among medical students compared to non-medical university students and the general population in Palestine.

Over half of the Palestinian youth show signs of depression, but there are few accessible counselling services, and a stigma around seeking therapy [45]. Unfortunately, cultural stigma and high costs may prevent many individuals from taking prescribed antidepressants. As a result, they may become more vulnerable to drug abuse and misuse. Prevention efforts, education on substance misuse, and confidential support and treatment are necessary to create a supportive environment that encourages seeking assistance. A stigma-free environment is also crucial to promote healing and recovery for those struggling with addiction. However, it is important first to characterize and address the extent of the problem. In this study, it seems that many students were not being prescribed antidepressants, and some chose to use them for various reasons. Although the prevalence of antidepressant drugs in this study (4.4%) was lower than the prevalence among medical students in other countries [46, 47], the percentage of students who use antidepressants without a prescription is higher than those seen in other Arab and international student populations [48, 49]. The fact that two-thirds of the drug users in this study used antidepressants without a prescription is a cause for concern. It emphasizes that mental health is neglected in Palestinian society and among students. It was found that the most frequently used family of antidepressants was SSRIs (Fluoxetine), which is consistent with other relevant studies [50, 51]. The reasons for using these medications among university students varied, including exposure to high levels of psychological, academic, or family pressure and a desire to decrease anxiety during exam periods. These motives align with those discovered in other studies [48, 52]. Moreover, one-fourth of the students appear to use them before enrolling at the university. Many potential factors could contribute to the high prevalence of nonprescribed antidepressant use, and these include limited access to healthcare services, the stigma associated with mental health conditions that can discourage individuals from seeking professional help, lack of awareness and education, conflict and trauma as Palestine has a history of conflict and political unrest, and socioeconomic factors. Additionally, it was observed that students often used antidepressants to alleviate anxiety during the examination period, reduce tension while studying, and combat extreme fatigue or exhaustion while preparing for the exam, which is consistent with other studies [48, 53].

It is important to note that self-medication with antidepressants or any medication without medical supervision can be risky. The most common side effects of antidepressants vary between studies [54–56]. This study's most frequently reported side effects were headache, nausea, and sleep disturbance. It is concerning that many students who used these drugs were not fully understand the potential harm they could cause. While it is understandable that students may learn about these drugs through university courses or the internet, seeking accurate and reliable information from reputable sources is essential. Stress, escapism, and lack of awareness or education led to drug abuse that can negatively impact a person's health, academic performance, and overall well-being. The results also emphasize the importance of increasing awareness regarding the use of these substances and giving students a legit platform to acquire valid and scientific knowledge about the safe use of these substances. Schools must prioritize drug education and early intervention to prevent harm to students' health and academic performance. It is also important to address the underlying causes of drug use, such as high pressure from academics or family, to prevent it effectively. It is essential to provide students with resources to manage stress and anxiety healthily rather than turn to drug use as a coping mechanism.

Numerous studies indicate that medical students tend to use stimulant substances and antidepressant medications at a significant rate for enhancement purposes [57–59]. A comprehensive understanding of the patterns and trends of substance use among students can be provided by examining substance use both before and during exams. It provides a baseline measurement of usage patterns under normal conditions, and this is essential for establishing a context and understanding any deviations or changes in substance use that occur specifically during the exam period [13, 14]. In this study, the rate use of all the reported substances increased during the exam period except for tea and hookah, which remained the same. Tea is widely used traditionally in Palestine, and preparing hookah requires time. These results indicate that students are more likely to use substances as a coping mechanism during high-stress periods [5, 60, 61]. Moreover, the results revealed that exams can lead to increased drug use due to various factors, such as stress and pressure, performance enhancement, sleep deprivation, and peer pressure. The long-term risks of these substance use

during exam periods can be significant and should be taken seriously. Physical health consequences include organ damage, cardiovascular problems, respiratory issues, neurological damage, compromised immune system, and increased susceptibility to infections. Mental health effects include anxiety disorders, depression, psychosis, and increased risk of suicide. Academic and professional setbacks include poor academic performance, legal and social consequences, addiction and dependency, impaired cognitive functioning, and increased risk-taking behaviors. Therefore, we recommend the implementation of evidence-based drug education programs, the creation of a supportive and inclusive university environment, the involvement of parents and caregivers in prevention efforts, the encouragement of positive peer influence, and the provision of opportunities for student leadership in drug prevention initiatives, the promotion of alternative coping strategies, and the development and enforcement of clear policies regarding drug use on campuses, including consequences for violations.

Several limitations should be considered in our study. This is a cross-sectional study, so the results should be interpreted cautiously because they did not test for temporality or establish causality. A selection bias is also possible because of the refusal rate and the convenience sampling technique. Self-reported substance abuse questionnaire was used. The religious and cultural stigma and legal issues prohibiting the use of alcohol and illicit drugs by law could provide underestimated outcomes compared to other countries. One of the illicit substance families not mentioned in our questionnaire is benzodiazepines, which may also underestimate drug abuse among medical students, especially with their increased use in the West Bank in the last few years [16]. Despite these limitations, this is the first study to cover licit, illicit, and antidepressant drug abuse among medical students in West Bank Palestine. It helps understand students' specific challenges and can help inform targeted interventions and support. It also provides important insights into the factors contributing to drug abuse among medical students, such as potential stressors, medication access, and societal influences. Finally, it can facilitate the development of comprehensive interventions and policies that address the unique challenges medical students face.

5 Conclusion

The misuse of antidepressant medications and other licit and illicit substances is highly prevalent among students in Palestine, both medical and non-medical. The study highlights that exam-related stress is a crucial factor in the prevalence of drug use and misuse among students. It was found that exams can result in a rise in drug consumption due to a range of factors, such as stress and pressure, the desire to enhance performance, and lack of sleep. Besides academic pressure, peer pressure, psychological, and family pressures were also primary reasons for drug use. Moreover, it is concerning that two-thirds of the drug users in the study used antidepressants without a prescription and emphasizing that mental health is neglected in Palestinian society and among students. Interestingly, medical students tend to use these substances less frequently than their non-medical peers. Given these findings, we recommend that schools take proactive measures, such as implementing comprehensive drug education, prevention initiatives, early intervention and support, confidential counseling, and awareness campaigns, to create an environment that fosters informed decision-making, healthy lifestyles, and well-being among students.

Acknowledgements We thank the participants for their collaborative participation that helped us to complete this project.

Author contributions All authors contributed to the study conception and design. Material preparation and data collection were performed by WK, MAY, AAE, AB, and MY. BD performed data analysis. The first draft of the manuscript was written by WK, MAY, AAE, AB, and BD, and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Funding No funding was received to assist with the preparation of this manuscript. The authors have no competing interests to declare that are relevant to the content of this article.

Data availability Most data generated or analyzed during this study are included in this manuscript. Other data supporting this study's findings and /or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all participants for being included in the study. The institutional review board (IRB) at An-Najah National University approved

[Approval number: Ref: Med. Sep 2022/7]. All study participants were freely accepted to join the study. Confidentiality was highlighted in all written and oral communications. Other ethical safeguards were employed: self-reported anonymous questionnaire was used and privacy.

Competing interests We declare that we have no competing interests.

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