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Original Research Article

Prevalence and patterns of substance use among women: An Egyptian cross-sectional study

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Abstract

Background: Substance use among females is growing, presenting a significant public health and forensic challenge that affects individuals and communities. This study explored the prevalence and patterns of substance use among a sample of Egyptian females, emphasizing their awareness of associated risks. It also investigated the toxicological and legal hazards faced due to substance use, highlighting the interplay between that problem and the socio-legal environment.
Materials and Methods: A cross-sectional study was conducted over six months, from July 1 to December 31, 2023. This study involved a non-random sample of Egyptian females aged 18 to 60 (n = 482). A structured, self-administered questionnaire served as the data collection tool.
Results: Of the 482 women, 34.6% (n=167) reported substance use. The largest group of users (38.3%) was in the 26-35 age range. There was a significant association between marital status and substance use ($p < 0.001$). Tobacco had the highest dependence rate at 66.6%, followed by psychotropics at 24%. The main motivation for substance use was emotional relief (51.5%), with performance enhancement at 19.8%. Awareness of risks such as overdose (86.2%) and organ damage (85.0%) was high, but understanding of withdrawal symptoms and drug interactions was limited. Common acute toxicity symptoms included respiratory issues (70.7%) and nausea/vomiting (58.7%), yet only 13.8% sought medical help. Legal consequences were minimal, with no arrests, but 28.1% faced drug testing and 19.2% experienced violent incidents due to impaired judgment.
Conclusion: These findings highlight the urgent need for integrated strategies combining mental health support, education, and harm reduction to address the rising substance use burden among females in Egypt. Improving forensic toxicology, expanding emergency care access, and reforming drug use laws could significantly lessen individual and societal harm. Future research should focus on monitoring emerging drugs and assessing context-specific interventions.

Keywords: Substance use, Drug abuse, Egypt, Overdose, Legal consequences, Addiction.

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1. Introduction

A drug is generally defined as a pharmaceutical preparation or a naturally occurring substance used to alter an existing process or state in a physiological, psychological, or biochemical way.[1] Substance/drug abuse means the use of drugs for a purpose other than their original purpose. These substances may include psychoactive drugs, alcohol, tobacco, and illicit drugs.[2] Substance abuse is a significant global public health challenge that has serious social, economic, toxicological, and legal implications. Although extensive research has been conducted on drug abuse, the issue among females remains less explored, especially in developing countries where cultural norms often stigmatize women's substance use.[3]

Recently, the gender gap in drug abuse is closing worldwide due to the availability and misuse of illicit substances, with rising rates of substance use among women in both developed and developing countries.[4] The World Health Organization (WHO) reported that around 5% of women aged 15 to 64 worldwide have used illicit drugs at least once in their lifetime. Higher prevalence rates are noted in urban areas and among marginalized populations.[5]

Females exhibit heightened vulnerability to the adverse effects of substance use disorders, attributable to a confluence of biological, psychological, and sociocultural determinants. Hormonal fluctuations can influence addiction pathways, while co-occurring mental health conditions, such as anxiety and depression, often exacerbate substance dependency.[6] Additionally, the prevalence of trauma and violence in

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women's lives further complicates their relationship with substances, potentially leading to a cycle of abuse that is both challenging to break and address within treatment paradigms.[7]

In developing countries, drug or substance abuse among women is a critical issue exacerbated by limited access to healthcare, inadequate legal protection, and pervasive stigma. These obstacles contribute to underreporting and severely hinder the implementation of effective intervention strategies.[6] Additionally, the forensic and toxicological aspects of drug abuse among women are not sufficiently explored, which is unacceptable given their vital role in criminal investigations, workplace safety, and public health surveillance.[8]

Egypt, as a developing country, faces distinct challenges in addressing the issue of drug abuse among its population. A 2019 report by the Central Agency for Public Mobilization and Statistics (CAPMAS) indicates that 6.4% of Egyptians aged 15 to 64 have reportedly used illicit drugs at some point in their lives, with cannabis identified as the most commonly abused substance.[9] It is important to highlight that the prevalence of drug abuse among women is reported to be notably low compared to men, which likely reflects considerable underreporting rather than an absence of drug abuse among females.[10]

Recent studies have highlighted emerging trends in substance abuse among Egyptian women. Prescription drug misuse, particularly of tramadol, has become increasingly common.[11] Additionally, although alcohol consumption is culturally discouraged, it has been reported among Egyptian women.[11] These findings emphasize the need for focused research to uncover hidden cases of substance abuse and address gender-specific perspectives.

The forensic and toxicological aspects of drug abuse among females present distinctive challenges. Forensic investigations frequently depend on toxicological analyses to identify and quantify substances present in biological samples, including blood, urine, or hair. However, gender-specific differences in pharmacokinetics, such as body composition, metabolism, and hormonal fluctuations, can significantly influence drug absorption, distribution, and elimination. These variations complicate the interpretation of toxicological data, necessitating a careful and nuanced approach to analysis.[13]

Drug-related offenses involving women, such as possession, trafficking, and intoxication-related crimes, pose significant legal and ethical challenges. In Egypt, cultural norms exert considerable influence over judicial processes, resulting in women engaged in drug-related activities facing harsher penalties and greater societal ostracism compared to their male counterparts.[14]

This research aimed to estimate the prevalence, patterns, and consequences of drug abuse among females, with special emphasis on its forensic and toxicological dimensions. By integrating epidemiological, forensic, and toxicological perspectives, it seeks to provide a comprehensive understanding of the problem and inform evidence-based policies to combat drug abuse among females in Egypt and other developing countries.

2. Subjects and Methods

2.1. Ethical considerations

The protocol of this study was approved by the Institutional Review Board of Alexandria University, Faculty of Medicine, Egypt (Approval number: 0306194, IRB number: 00012098, FWA number: 00018699). The data collection process followed the principles outlined in the Declaration of Helsinki. Informed consent was obtained from all participants, who were made aware of every aspect of the study. They also had the right to withdraw from the study at any time without facing any negative consequences. The confidentiality of all respondents was preserved throughout the research.

2.2. Study design and setting

A cross-sectional study was conducted over a six-month period, from July 1 to December 31, 2023. This study involved a non-random sample of Egyptian females aged 18 to 60. A descriptive survey research design was assumed; participants were gathered from various women's communities, including sporting clubs, gyms, universities, workplaces, obstetric health clinics, maternity wards, family planning clinics, and social media platforms such as WhatsApp groups focused on women’s issues or hobbies.

2.3. Sampling and sample size

The sample size for this study was calculated using OpenEpi version 3 (an open-source sample size calculator) to ensure adequate statistical power and precision. Based on a total target population of approximately 25 million females within this age group, a confidence level of 95% (Z = 1.96), and a margin of error of ±5%, the initial required sample size was determined using the formula for estimating proportions:

$$n = \frac{Z2\ p(1-p)}{E2}$$

Assuming a conservative prevalence rate (p) of 50% to account for maximum variability, the baseline sample size was calculated to be 385 participants. To adjust for a potential incomplete response rate of 20%, the sample size was increased by dividing the initial estimate by 0.80, resulting in a final required sample size of 482 participants. Given the large population size, a finite population correction was not applied, as the calculated sample size represented less than 5% of the total population.

2.4. Eligibility criteria

Egyptian competent women aged 18 to 60 who attended various women's community gatherings and consented to participate in the study were considered eligible and included. Non-Egyptian individuals, those who refused to participate, and individuals who submitted incomplete questionnaires were excluded from the study and were substituted by others to complete the proposed sample size.

2.5. Data collection tool

A structured, self-administered questionnaire was used as a data collection tool. That questionnaire consisted of 15 multiple-choice questions divided into several sections: demographics, social situation and education, smoking history, types of substances used, and legal and toxicological consequences of drug use faced by users. The tool was developed using validated instruments from previous studies on substance abuse and was specifically tailored to gather the necessary data for the current study. It was intended to avoid a high number of questions and not to be boring to participants. Additionally, an Arabic version of the questionnaire was created to suit less educated respondents.

To ensure clarity and cultural relevance, the questionnaire was pilot-tested by direct interviews of a small sample of women (n=30) and refined accordingly. Data were collected through online platforms (e.g., Google Forms) and in-person distribution through a research team composed mainly of university students. This approach ensured accessibility for participants across diverse geographic and socioeconomic backgrounds. Participants were assured of anonymity and confidentiality to encourage honest responses. The structured format of the questionnaire facilitated standardized data collection, enabling reliable statistical analysis and interpretation of findings.

2.6. Definitions used to describe the pattern of substance users:[15]

1. *Experimental users:* Individuals who have explored the use of substances on a limited basis, yet do not engage in regular consumption or exhibit dependency.
2. *Regular users*: These individuals engage in daily substance use for over a month, demonstrating a pattern of habitual dependence that is difficult to break.
3. *Dependents/Addicts:* The DSM-IV criteria for dependency state that throughout 12 months, at least three of the seven characteristics listed below must be present: Tolerance, signs of withdrawal, use over longer periods or in greater quantities than planned, enduring desire or fruitless attempts to reduce consumption, Time is spent getting drunk or getting over the consequences, drug abuse results in a reduction or cessation of social, professional, and leisure activities. Despite being aware of the negative effects of drugs, use persists.

2.7. Statistical analysis

Analyses were conducted utilizing SPSS version 28.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were reported as counts (n), percentages (%), means ($\bar{x}$), and standard deviations (SD). The significance of associations between the two groups concerning qualitative variables was evaluated using the Chi-squared (χ^2) test. Fisher's exact test was conducted when the expected frequency in any cell was less than.[5] An unpaired t-test was used to compare the means of two quantitative variables that followed a normal distribution. A p-value of less than 0.05 and a 95% confidence interval were considered statistically significant.

3. Results

A total of 482 women participated in the study, divided into two categories: users (n=167, 34.6%) and non-users (n=315, 65.3%) of substances. **Table 1** provides a demographic distribution of the respondents. The largest group of substance users was in the age range of over 25 to 35 years (38.3%), followed by the age group of 18 to 25 years, which comprised 22.1% of the users. The smallest percentage of users was in the age group of 55 to 60. Chi-square test showed a statistically significant difference in the age group distribution among substance users ($p=0.034$). It was found that a higher percentage of separated/divorced/widowed women were substance users (40.7%) compared to single (23.4%) or married (35.9%). Chi-square test revealed a significant association between marital status and substance use. ($p < 0.001$).

Regarding the educational level of the responders, a higher percentage of users had a secondary school level of education or less (46.1%). There was a statistically significant association between the educational level and substance use among the respondents ($p < 0.001$). Regarding occupation, about one-third of users were freelancers (working outside organizations). Occupation was significantly associated with substance use ($p < 0.001$).

Figure 1 details the frequency and percentage of substance use among 167 women identified as substance users in the study. Tobacco (cigarette, Shisha, or vape smoking) was the most prevalent substance used by this group (93.3%), followed by hashish/ bhang (73.1%). Antipsychotics/sedatives (47.3%), and Tramadol (33.5%) also showed high prevalence of use; however, cocaine (9%), and Alcohol (7.8%) had lower prevalence but still represent a notable portion of substance use. Strox/voodoo (5.4%), heroin (1.8%), and other substances (6.6%) showed the lowest prevalence among users.

Table 2 demonstrates the pattern of substance use among users, where the majority of tobacco users (66.67%) were dependent. Regular use dominated among hashish/bhang, psychotropics, alcohol, and opioid users (74.59%, 58.2%, 69.2%, and 55.3%, respectively), indicating habitual consumption rather than experimental or dependent use. However, experimental use dominated with Strox/voodoo (66.6%). The one-way ANOVA test confirmed that there was a significant variation in the frequency of substance use across the three patterns of use ($F(2,12) = 15.45$, $p<0.001$). Users in the regular group exhibited the highest frequency of use, and those in the experimental use group showed the lowest frequency. This finding highlights the progression from experimental use to dependence. **Table 3** illustrates the distribution of self-reported causes or motivations for substance use among the users. The most frequently cited motive was emotional relief (51.5%). A notable proportion of users (19.8%) attributed their substance use to performance enhancement. Curiosity was reported as a cause by 16.2% of the users, while peer pressure was the least frequent cause, reported by 12.6%.

Descriptive statistics regarding substance users' awareness of the toxicological and legal consequences of substance abuse are presented in Table 4. Most users reported a high level of awareness about legal issues related to substance use. Specifically, 95.2% were knowledgeable about drug testing in investigations, and 97.6% were familiar with Egyptian laws concerning drug use and possession. Additionally, a significant majority recognized the risks associated with substance use, with 86.2% acknowledging the potential.

For overdose toxicity, 85.0% were aware of the possibility of long-term organ damage. However, only 67.1% understood that substance use can impair judgment and increase the risk of criminal behavior. The proportion of users who reported being "Not Aware" of these issues was quite low, ranging from 0.0% to 11.4%. The percentage of users who were "Not Sure" varied, with the highest uncertainty observed regarding withdrawal symptoms (19.2%) and the effects of substance use on judgment and crime (21.6%).

Table 5 provides a summary of the descriptive statistics of the health problems associated with substance toxicity among users. The most commonly reported issue was respiratory complications, experienced by 70.7% of users. Other frequently reported symptoms included nausea and vomiting (58.7%) and dizziness (47.9%), indicating that these general symptoms are prevalent among those who use substances. Additionally, 25.7% of users reported experiencing hallucinations, while 21.6% experienced a loss of consciousness, suggesting that a significant number of users faced more severe neurological or psychological effects. Seizures were reported by 7.2% of users, indicating the potential for severe consequences resulting from substance toxicity.

It is concerning that only 13.8% of users sought medical treatment or required admission to a poison center for acute overdose toxicity. This low percentage may suggest either underreporting of severe toxicity cases or a lack of access to medical care, or a willingness to seek help.

Table 6 illustrates the distribution of substance users based on their self-reported legal issues related to substance use. Most users, 67.1%, reported no legal problems, while 28.1% faced drug testing for legal reasons. Involvement in violent incidents occurred in 19.2% of users due to impaired judgment. A smaller percentage (3.6%) reported theft or property crimes to support substance use habits. Notably, none of the users reported arrest and charges for possession of illicit drugs within this sample.

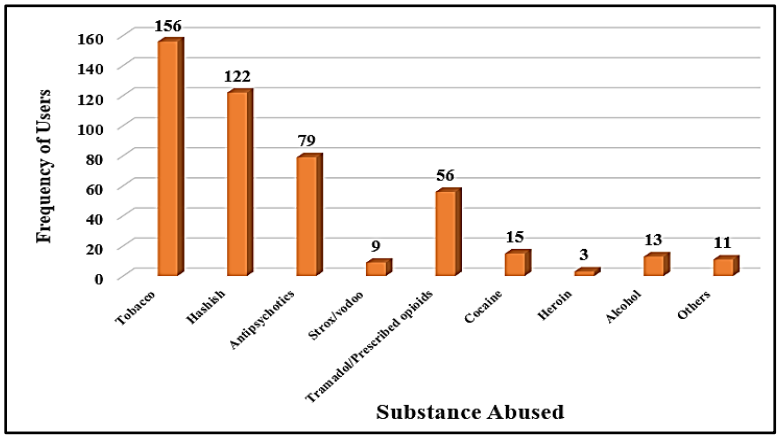

Figure 2: Distribution of the prevalence of the abused substances among users (n=167).
Note: The percentages do not add up to 100% because individuals may use more than one substance (multiple substance us.

Table 1: Distribution of responders according to their demographic characteristics (n=482)

Categorized Demographic Variables	**Users (n=167, 34.6%)**		**Non-users (n=315, 65.3%)**		**Total (482, 100%)**	
Age Group	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**
18- ≤25	37	22.1	83	26.3	120	24.9%
>25- ≤35	64	38.3	86	27.3	150	31.1%
>35- ≤45	33	19.7	77	24.4	110	22.8%
>45- ≤55	26	15.5	46	14.6	72	14.9%
>55-60	7	4.1	23	7.3	30	6.2%
Marital Status						
Single	39	23.4	151	47.9	190	39.4
Married	60	35.9	142	45.1	202	41.9
Separated (Divorced/Widowed)	68	40.7	22	7.0	90	18.7
Education Level						
Illiterate	13	7.8	7	2.2	20	4.1
Secondary school or less	71	42.5	122	38.7	193	40.0
Some College	43	25.7	87	27.6	130	27.0
Bachelor's Degree	29	17.4	66	20.9	95	19.7
Postgraduate Degree	11	6.6	33	10.5	44	9.1
Occupation						
Student	20	12.0	26	8.3	46	9.5
Laborer	29	17.4	7	2.2	36	7.5
Commercial (Freelancer)	54	32.3	73	23.2	127	26.3
Housewife/Unemployed	41	24.6	101	32.1	142	29.5
Specialist/Office work	23	13.8	108	34.3	131	27.2

Table 2: Distribution of substances among the users (n=167) according to the pattern of substance abuse:

	Experimental Use	**Regular (Occasional) Use**	**Dependence**	**Total**
	N (%)	**N (%)**	**N (%)**	(100%)
Tobacco (cigarette, Shisha, Vape)	18 (11.5%)	34 (21.7%)	104 (66.6%)	156 (100%)
Hashish/ bhang	22 (18%)	91 (74.6%)	9 (7.4%)	122 (100%)
Psychotropics	12 (15.2%)	46 (58.2%)	19 (24%)	79 (100%)
Strox/ Voodoo	6 (66.6%)	1 (11.11%)	2 (22.2%)	9 (100%)

Opioids (Tramadol, prescription opioids)	15 (26.8%)	31 (55.3%)	10 (17.8%)	56 (100%)
Cocaine	11 (73.3%)	0 (0%)	4 (26.7%)	15 (100%)
Heroin	3 (100%)	0 (0%)	0 (0%)	3 (100%)
Alcohol	4 (30.8%)	9 (69.2%)	0 (0%)	13 (100%)
Others	2 (18.2%)	8 (72.7%)	1 (9.1%)	11 (100%)
Total	93	220	149	p<0.001

Note: The percentages do not add up to 100% because individuals may use more than one substance with different patterns of use (multiple substance us

Table 3: Distribution of Substance Users according to motivations of substance use: (n=167)

Causes of Substance Use	**Frequency (n)**	**Percentage (%)**
Peer Pressure	21	12.6
Curiosity	27	16.2
Performance enhancement (work/school)	33	19.8
Emotional relief (stress, depression)	86	51.5
Total	167	100%

Table 4: Distribution of substance users according to their awareness of toxicological and legal consequences of substance abuse (n = 167)

Toxicological/ Legal Consequences	**Aware**		**Not Aware**		**Not sure**	
	n	%	n	%	n	%
Substance use can lead to overdose toxicity.	144	86.2%	19	11.4%	4	2.4%
Long-term substance use can damage organs (e.g., liver, lungs, heart, brain).	142	85.0%	14	8.4%	11	6.6%
Mixing substances can cause toxicity up to death.	132	79.0%	16	9.6%	21	12.6%
Risk of withdrawal symptoms on quitting the substance use.	124	74.3%	11	6.6%	32	19.2%
Risk of adverse interactions with medications.	129	77.2%	13	7.8%	25	15.0%
Drug testing is used frequently in legal investigations.	159	95.2%	3	1.8%	5	3.0%
Substance use can impair judgment and increase the risk of being a victim or a perpetrator of a crime.	112	67.1%	19	11.4%	36	21.6%
Egyptian laws specific to drug use and possession.	163	97.6%	0	0.0	4	2.4%

Table 5: Distribution of substance users according to their experienced health problems related to substance toxicity: (n=167)

Health problems due to Acute Substance Toxicity/Overdose	Frequency (n)	Percentage (%)
Nausea/Vomiting	98	58.7
Dizziness	80	47.9
Loss of consciousness	36	21.6
Hallucinations	43	25.7
Seizures	12	7.2
Cardiac complications	51	30.5
Respiratory complications	118	70.7
Sought medical treatment/ admission to a poison center upon an acute overdose toxicity.	23	13.8

Note: the percentages do not add up to 100%, indicating that some users experienced multiple health problems.

Table 6: Distribution of substance users according to their experienced legal issues related to substance toxicity: (n=167)

Legal Problems	Frequency (n)	Percentage (%)
Didn't experience any problem	112	67.1
Drug testing for legal purposes (traffic stops, hiring, workplace incidents, or criminal investigations)	47	28.1
Involvement in violent incidents (as a perpetrator or victim) due to impaired judgment.	32	19.2
Theft or property crimes to support substance use habits	6	3.6
Arrest and charges for possession of illicit drugs	0	0.0

Note: the percentages do not add up to 100%, indicating that some users experienced more than one problem.

4. Discussion

Problematic substance use among women is alarmingly increasing. Women constitute approximately one-third of all drug users worldwide and represent one-fifth of all injecting drug users. Global data indicates that 46 million women are diagnosed with alcohol use disorders.[4,16] Meanwhile, there is some delay in acquiring accurate statistics about the phenomenon of drug use among women in developing countries, including Egypt.

The present study used a self-administered questionnaire as its data collection tool to evaluate the prevalence, patterns, factors, and consequences associated with substance abuse among females aged 18 to 60 in Egypt. The age group most likely to consent to participate in the study, those aged 26 to 35, comprised the largest percentage of respondents at 31.1%.

Among the studied population sample (n=482), 34.6% (n=167) reported to be drug users. Most of them fall within the 25-35 age group (38.3%), followed by the 18-25 age group (22.1%). This finding aligns with the general trend of the high prevalence of drug use among women in the reproductive age period.[17] At the same time, many studies have proven that drug abuse is more prevalent among young adults.[18-20]

The high prevalence of substance use among divorced/separated women and the low prevalence among married women in the present study reflect a statistically significant association between marital status and substance use (p<0.001). This aligns with a previous Egyptian study, which indicated that marital instability (e.g., divorce or separation) is a significant risk factor for substance use, possibly due to emotional distress and lack of social support.[21] A study by Fals-Stewart et al. highlighted the mutual relationship between substance misuse and relationship discord. They found that substance use can worsen marital issues, while marital problems can increase the likelihood of substance use. According to their findings, marriage often provides social support, financial stability,

and emotional security, all of which act as protective factors against substance abuse.[22]

In this study, single individuals had a moderate prevalence of substance use, suggesting they are at intermediate risk compared to married and divorced/separated individuals. This finding aligns with an Egyptian study about cannabinoid abuse among university students, which concluded that single individuals may have fewer social constraints but also lack the protective benefits of marriage.[10]

The current results indicate that 42.5% of users have a secondary school education or less, while only 6.6% hold postgraduate degrees. These findings align with previous studies suggesting a correlation between lower education levels and higher rates of substance use. Hamdi et al. (2016) reported that less educated individuals were more likely to use substances due to limited awareness of risks and fewer social restrictions.[21] Likewise, the highest percentage of substance users was among illiterates in another Egyptian study.[23] However, stress-related factors, such as academic pressure or work-related challenges, may explain substance use among bachelor's and postgraduate degree holders.[11] The study found a significant association between occupation and substance use. Among respondents, 32.3% of commercial freelancers used substances, similar to their overall sample representation of 26.3%. In contrast, 17.4% of laborers, who made up only 7.5% of the total sample, reported substance use, indicating a disproportionate impact on this group. Hamdi's study also noted a high prevalence among laborers.[23] Certain groups face risks from irregular income, financial stress, and environments that normalize substance use. A 2016 study by Hamdi et al[21] found that manual laborers and skilled workers are more likely to use substances due to physically demanding jobs, financial instability, and limited access to addiction prevention programs.

A high percentage of housewives/unemployed respondents (24.6%) were substance users. This group may face unique stressors, such as social isolation or domestic pressures, which could contribute to substance use. Other studies have noted that unemployed individuals are at higher risk of substance abuse due to feelings of hopelessness and social exclusion.[11,24]

Only 13.8% of specialist/office workers were substance users, despite comprising 27.2% of the total sample. This group shows lower substance use prevalence and better access to resources that discourage abuse, suggesting that occupation fulfills social and psychological needs as well as financial ones.[24]

It was found that 12.0% of participating students used substances. This aligns with prior studies indicating that students are at risk due to peer pressure, academic stress, and curiosity about drugs.[2,10] The lower prevalence of substance use among specialist/office workers supports research indicating that higher education and stable employment act as protective factors. However, burnout and work-related stress may still pose risks, particularly in high-pressure environments.[25]

The study found that 63% of users consumed multiple substances, with tobacco (cigarettes, shisha, vapes) being the most common at 93.4% (n=156). This high prevalence is attributed to nicotine's neurochemical effects and social normalization.[21] Noticeably, 66.6% of tobacco users were classified as dependent, reflecting global trends of its use, especially among adults. The high nicotine content contributes to its strong addictive potential, causing quick progression from experimentation to dependence.[4,26] In contrast, some studies reported lower dependence rates among women, possibly due to cultural or regulatory factors affecting access and consumption patterns.[27]

The second most frequently abused substance was hashish/bhang, a natural cannabinoid, where 73.1% of current users reported its use. The high prevalence of cannabinoid products in Egypt can be attributed to their cultural and regional accessibility. This trend aligns with earlier studies that indicate cannabis usage is common among Egyptians, who often view it as a natural plant that is safer than other drugs.[10,21,28]

Cannabis (hashish/bhang) showed a unique pattern of use in the present study; most users (74.6%) were regular/occasional, whereas only 7.4% were categorized as dependent. Experimental users accounted for 18%. This relatively low rate of dependence is consistent with literature suggesting that cannabis has a lower risk of dependence compared to other substances, likely due to slower development of tolerance and milder withdrawal symptoms.[15,29] However, the high proportion of regular users raises concerns about long-term health consequences and potential for escalation under certain conditions, such as early initiation or heavy use.

Remarkably, about half of the users consumed psychotropics (benzodiazepines or antidepressants), consistent with a recent Egyptian study highlighting high psychotropic abuse among adolescents,[26] as it was the second most commonly abused substance in their study. In the current survey, psychotropic drugs had a dependence rate of 24%, with 58.2% of users classified as regular and 15.2% as experimental. This highlights a significant issue with prescription medication misuse, a growing public health concern worldwide.[15,30] The high level of regular use suggests that these drugs are often misused without medical supervision, especially among women with limited mental health resources.

33.5% of the present users reported using tramadol or prescription opioids. This trend is increasing in Egypt, where tramadol is easily accessible and often misused for recreational and pain relief purposes. This situation has raised

serious concerns due to the drug's widespread availability and high potential for abuse[10,18] In contrast, heroin, which is a synthetic opioid, accounted for only 1.8% of the reported substances in this study. Women tend to use smaller amounts of heroin, use it for shorter durations, and are less likely to inject it compared to men.[6]

Research indicates that women are more likely to misuse illegal opioids, including prescription medications such as oxycodone, nalbuphine, and pethidine, as well as tramadol, to self-medicate for pain or anxiety. This tendency may be linked to the fact that women typically experience chronic pain more often than men, as they are more sensitive to pain. Additionally, due to a stronger dopamine response in their brains, women may develop dependence on opioids more quickly than men.[31-32]

Opioid use was dominated by regular users (55.3%), with a relatively low dependence rate (17.8%). This contrasts with the opioid crisis observed in Western countries, where dependence rates were significantly higher.[33] The lower dependence rate in the present study may reflect the characteristic pattern of opioid abuse among women in Egypt.

Opioids, particularly tramadol, have grown to be a significant problem in developing nations, where abuse tendencies frequently start with medicinal channels before expanding into dependence and regular usage.[20,34] Tramadol abuse in Egypt has surged recently, as it is cheap, easily smuggled, and available without a prescription. Many women believe it is safer because it is a medication prescribed by doctors. Additional misconceptions include a lower risk of consequences if caught, longer-lasting effects, and ease of disguise. Notably young women often use tramadol during exams to enhance energy and extend study sessions.[35]

Cocaine and heroin exhibited distinct usage patterns in this study. Cocaine had a high proportion of experimental users, comprising 73.3% of cases, but a relatively low dependence rate of 26.7%. This aligns with its known addictive potential.[15]In contrast, heroin demonstrated 100% experimental use; however, due to the small sample size (only 3 cases), this result should be interpreted with caution. These findings may indicate limited availability of the substance or social stigma associated with heroin use in this context.

Concerning alcohol consumption, 7.8% of the present users reported using it. This comparatively low incidence is consistent with the Egyptian cultural norms, which forbid drinking for social and religious reasons.[19] However, it is crucial to note that even modest prevalence can point to serious public health issues, particularly if users engage in harmful drinking habits.[12,13] Alcohol use was primarily regular or occasional (69.2%), with no reported dependence cases. this contrasts with global data showing alcohol as a leading cause of substance dependence.[5] This could suggest either underreporting or a distinct pattern of alcohol consumption among women. Previous studies indicate that women are more likely than men to drink alcohol in response to stress and negative emotions. In contrast, men tend to drink more often to enhance positive emotions or to fit in with social groups.[36,37]

Strox/Voodoo, synthetic cannabinoids abused in parts of Africa and the Middle East, were reported by 9 users. Among them, 66.6% were experimental, 1.11% regular, and 22.2% dependent. This suggests that while initial exploration is high, negative side effects or regulations may limit continued use. However, the significant dependence among persistent users highlights the addictive nature of these substances.[4] Because of their potency and legal ambiguity, synthetic cannabinoids are increasingly linked to experimentation followed by quick reliance, especially in young people.[10]

The "others" category in the present study included substances like inhalants or hallucinogens, with 72.7% regular users, 18.2% experimental, and 9.1% dependent. These figures suggest that alternative substances are frequently used regularly, perhaps due to their easy availability or social acceptance in specific subcultures.[38]

The findings indicate that the transition from experimental use to regular (occasional) usage and dependency varies significantly between different drugs ($p<0.001$). This variability highlights that not all substances follow the same path toward dependence, and each drug is linked to specific behavioral patterns of use.

Even after tobacco was excluded, there was a noticeable shift from experimental to regular use of other substances. This suggests that the variance in drug use patterns is due to fundamental differences among the various types of substances, rather than being solely linked to tobacco. Alcohol, cannabis, and other drugs were still primarily associated with frequent use rather than dependence. Opioids and psychotropics showed a strong potential for dependency regardless of smoking. Additionally, many experimental users of Strox/Voodoo developed dependence, emphasizing the unique risks of synthetic cannabinoids. This suggests that substance-specific factors still heighten the risk of dependency, underscoring the need for targeted prevention and treatment.

The study provided valuable insights into the psychosocial and cultural factors driving substance use among women. Notably, 51.5% of users reported seeking emotional relief, aligning with research showing that mental health issues like anxiety and depression often precede substance use in women.[6] This pattern strengthens the fact that substance use may start for many females as self-medication to cope with stress before progressing to abuse or dependence.

This coping mechanism may be even more prevalent in low- and middle-income countries, where official mental health facilities are frequently scarce or stigmatized. This is particularly true for young women and adolescent girls who are dealing with early marriage, gender-based violence, or social pressures.[11]

In this study, nearly one-fifth of users (19.8%) reported performance enhancement as a motive for drug abuse. This category may include female students or working professionals seeking to manage academic or occupational demands. While traditionally more associated with males, recent studies indicate a rise in substance use among females to enhance focus, energy, or productivity, especially in competitive educational or work environments.[39]

The current finding that 16.2% of users indicated curiosity as a motive for substance use suggests that experimenting still plays a role in first-time substance consumption. Curiosity-driven use is common among females, particularly adolescents, in social or relational contexts such as intimate friendships or love partnerships.[26]

The present study found peer pressure to be less influential (12.6%) compared to previous research, which highlighted its significance among males using illicit substances.[26,40] This may be due to differing initiation patterns between genders, where females are more affected by smaller peer groups or intimate relationships. In conservative environments, family and community expectations may also play a larger role in female behavior than peer pressure.[13]

Awareness was generally high across most domains, but significant information gaps remained regarding drug interactions, withdrawal symptoms, and impaired judgment. There was a strong awareness of direct health risks from substance abuse, aligning with previous research showing that substance users often recognize the acute health dangers, especially those highlighted by media and prevention campaigns.[41] Nonetheless, awareness does not always lead to changes in behavior. Previous research indicates that even when users grasp the risks, they may opt for risk minimization strategies, such as controlling dosage or frequency, instead of complete cessation.[11] High awareness of direct harm is positive, but it needs to be paired with effective interventions to reduce risk. The current results indicated lower awareness of complex consequences like withdrawal symptoms, drug interactions, impaired judgment, and criminal involvement. This is concerning, as these less visible consequences can significantly affect long-term health and social functioning.[42] Similarly, poor judgment makes people more susceptible to sexual assault, violence, and criminal activity, all of which are serious illegal actions, particularly for female users.[6]

The current study indicated a high level of awareness regarding legal issues related to drug use. In a country like Egypt, where anti-drug laws are strict and enforcement is visible through frequent police operations and media reports on drug-related arrests, this finding aligns with logical expectations.[4,21]

These results agreed with research from both high-income and low- and middle-income countries, showing greater awareness of immediate physical harms and legal consequences, but less understanding of subtle physiological and psychological risks.[41] This suggests that knowledge alone cannot change behavior; motivation, support, and environmental changes are also essential.

A significant number of substance users in the study suffered health complications from acute toxicity or overdose, with respiratory issues (70.7%) and nausea/vomiting (58.7%) as the most common symptoms. These findings highlight the serious burden of acute toxicity and the urgent need for targeted preventative and therapeutic measures.

The high occurrence of respiratory complications observed in this study may be attributed to the use of opioids, sedatives, and certain inhalants. These substances significantly depress the central nervous system and impair respiratory function. Opioids, in particular, are known to cause dose-dependent respiratory depression, which is a leading cause of overdose fatalities.[43] Similarly, nausea and vomiting (58.7%) are common signs of acute toxicity, especially among users of stimulants, hallucinogens, and cannabis derivatives like hashish.[10]

A significant portion of current users reported experiencing dizziness (47.9%), indicating possible impairment of the central nervous system. Additionally, 25.7% reported hallucinations, which may suggest the use of psychotropics or high doses of stimulants. Cardiac complications were recorded in 30.5% of users, pointing to cardiovascular stress likely resulting from stimulant use or polydrug combinations involving alcohol or opioids. These findings align with global reports on the toxicity of psychoactive substances.[44]

The current reporting of seizures (7.2%), although relatively low, should not be underestimated, as they are often associated with severe toxicity from substances such as tramadol, synthetic cannabinoids, or stimulants.[44]

Over one-fifth of participants (21.6%) experienced loss of consciousness after substance use, a serious sign of overdose severity and potential risk of death, especially in opioid overdoses.[43] These findings are consistent with international studies documenting the wide range of acute toxicities associated with substance use.[45]

Obviously, despite the high incidence of acute health issues, only 13.8% of participants sought medical treatment or contacted a poison center after an overdose. This concerningly low rate of healthcare utilization suggests that

there are significant barriers to accessing care, including fear of legal consequences and the stigma associated with substance use.

This trend has been observed in both high-income and low- and middle-income countries (LMICs), where individuals often refrain from seeking formal medical assistance unless necessary.[14] In Egypt, where drug-related arrests are common and stigma surrounding addiction, especially for women, is particularly strong, these barriers may be even more significant.

The present study examined the legal consequences faced by 167 substance users. The findings revealed that while the majority (67.1%) did not report any legal issues, a notable proportion experienced challenges related to drug testing (28.1%), violence from impaired judgment (19.2%), and theft or property crimes (3.6%) to support their substance use habits. Importantly, none of the participants reported arrests or charges for drug possession, which could indicate underreporting or may be a limitation of the non-randomized sampling method used in the study.

The high proportion of individuals without legal issues suggests either low detection or enforcement of drug laws in this population or that many users engage in discreet, non-criminalized patterns of use that evade legal scrutiny. However, some participants may have been hesitant to disclose legal encounters due to fear of repercussions from Egypt's strict anti-drug laws, which impose severe penalties for minor offenses.[3,4]

Over a quarter of current users (28.1%) had undergone drug testing for legal reasons such as traffic stops, employment screening, workplace incidents, or criminal investigations. This indicates the increasing use of drug testing by law enforcement and in workplaces, especially in urban areas with higher substance use and stricter regulations.[38] This agrees with the global trends, where mandatory drug testing is common in many countries, particularly for jobs in sensitive sectors such as transportation, security, and public service.[46] Such policies can act both as a deterrent and a barrier to employment for individuals with substance use histories.

About one-fifth of present users reported involvement in violent incidents, either as perpetrators or victims, due to impaired judgment from substance use. This aligns with the evidence connecting psychoactive substances, particularly alcohol and stimulants, to increased aggression and vulnerability to victimization.[6,35] These findings emphasize the need for interventions addressing the social and behavioral risks associated with intoxication, particularly among women.

Only a small minority (3.6%) reported theft to support substance use habits. This contrasts with global studies that have found higher rates of financially motivated crime among chronic or dependent users, particularly those using expensive or illicit drugs like heroin or cocaine.[47]

The relatively low incidence in this context may be attributed to several factors: the affordability and accessibility of certain substances, such as cannabis and tramadol, the existence of family or social support systems that assist in sustaining users, and the possibility of underreporting due to stigma or legal concerns. Even at low levels, these behaviors highlight the societal costs of untreated substance use, affecting community safety and justice systems.

Strikingly, none of the participants reported being arrested or charged for possession of illicit drugs, in contrast to international data.[4] Underreporting also may explain these discrepancies.

5. Conclusion

This study provided valuable insights into the prevalence and patterns of substance use among Egyptian women, revealing a high awareness of major drug-related risks but limited understanding of indirect consequences such as withdrawal symptoms and cognitive impairments. Tobacco showed the highest dependence rate, followed by psychotropics and opioids, signaling growing concerns around both traditional and prescription substance misuse. Meanwhile, cannabis was predominantly used regularly without progressing to dependence.

Emotional relief was the primary motive for use, underscoring the link between mental health and addiction. Despite experiencing acute toxicity symptoms, few women sought medical help, likely due to healthcare barriers or fear of stigma and legal consequences. While criminal arrests were not reported, drug testing and violence related to impaired judgment were notable. However, the findings also highlighted underexplored areas, such as the barriers to treatment faced by women and the potential underreporting of substance abuse among them.

In conclusion, the study illuminated the complex sociocultural, psychological, and legal dynamics of substance use.

6. Recommendations

Integrated mental health and addiction services are needed, especially for women using substances as a coping mechanism for stress or depression. Targeted educational programs and culturally appropriate interventions that focus on the risks of misuse, particularly among young people and working professionals.

Additionally, improved access to emergency care and forensic toxicology services with legal reforms to reduce stigma and criminalization, encouraging affected women to seek help without fear of prosecution. Strengthening poison

control centers and expanding community-based outreach could bridge the gap between users and emergency care services.

6.1. Strengths of the study

To the knowledge of the author, this is the first national study that focused on comprehensive analysis of the problem of substance abuse among a sample of Egyptian women. the Comprehending the dynamics of forensic and toxicological aspects of this problem is essential for the development of equitable legal frameworks and rehabilitation programs specifically designed to address the needs of female offenders.

6.2. Limitations of the study

There was a potential self-report bias, as participants may underreport substance use due to social stigma; also, the cross-sectional design limits the ability to establish causality. Future research should consider longitudinal studies on randomized samples and incorporate qualitative methods to provide a more in-depth understanding of this issue.

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8. Conflict of Interest

The authors declare that they have no competing interests.

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