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Prevalence of drug abusers in patients undergoing elective surgeries at the Cairo University Teaching Hospital; Prospective cohort study

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ABSTRACT

Background and Aim: : Drug abusers are presenting a challenge to the anaesthetist because of the added potential risks involved in the administration of anaesthesia to this subset of patients. In this study, we aimed at screening all patients scheduled for elective orthopaedic, general, vascular, and plastic at the Cairo University Teaching Hospital during a set period of time for the most commonly abused drugs in Egypt.

Methods: : All patients included in the study were consented for taking part in this study. Each patient was asked to answer a form and submit a urine sample in order to be screened for the most commonly abused drugs in Egypt (hashish, tramadol, benzodiazepine, and morphine). Patients were then followed up both intra and post-operatively. Incidence of drug abuse among those patients was set as primary outcome, intraoperative hemodynamic, Richmond Agitation-Sedation Scale (RASS) scores as well as clinical recovery scores (CRS) were set as secondary outcomes.

Results: : Out of a total of 1106 patients screened during the study period, only 500 met inclusion criteria and consented to be part of the study. Results showed evidence of drug abuse among 14.4% of study patients, with frequencies of drugs abused as follows: hashish (11.4%); tramadol (5%); benzodiazepines (1.6%); and morphine (0.4%). Most patients that showed evidence of drug abuse were among those scheduled for orthopaedic surgeries, and a higher percentage of them were males.

Conclusions: : Within the study group, cannabinoids were the most frequent substance of abuse, followed by tramadol and then other opioids.

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Drug abuse; Cairo; Teaching Hospital; elective surgery

1. Introduction

One of the most challenging group of patients to anesthetists are those who abuse drugs. In drawing up a plan for anaesthesia, an anaesthetist must consider the type of drug abused and its harmful effects, the possibility of comorbidity with infectious diseases such as HIV-AIDS or hepatitis, and the potential need to alter doses of the anaesthetics to be given [1,2].

Drug abusers may be defined as persons who use a legally dispensed drug outside the scope of its medical indications, or those who use an illegal substance in order to reach some state of altered continuousness, such as heightened sense of pleasure or experience of hallucinations. On the other hand, drug addicts are those who compulsively use a substance of abuse with no regard to its harmful negative impact on their social life, their psychological well-being, or their physical state. The term *addiction* indicates dependency, whilst *abuse* does not necessary entail lack of self-control [][3].

A 2013 joint report by the Cairo University Faculty of Medicine and the Egyptian Ministry of Health estimated that drug abuse in Cairo had stood at 7% of the population, compared with a world average of 5% [4]. The Cairo University Teaching Hospital is a large hospital that houses around 56 operating rooms. It is a tertiary hospital that receives large numbers of referrals – often working beyond capacity – with around 2 million patient admissions per year [5]. The relatively large number of patients served yearly present anaesthetists at the Cairo University Teaching Hospital with additional challenges compared with other anaesthetists around the country.

Prior to the present study, no studies, screens, or statistical surveys had examined the incidence of drug abusers among preoperative patients in Egypt or discussed the challenges that drug abuse may pose to the conduction of safe anaesthesia and surgery.

This study aimed to estimate the prevalence of drug abusers among a set of patients who were scheduled for elective surgeries at the Cairo University Teaching Hospital.

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Clinical trial registration ID: The study was registered at clinicaltrials.gov (NCT05123521)

2. Patients and methods

This was a prospective observational study that was performed at the Cairo University Teaching Hospital between August 2018 and February 2019. Approval was obtained from the Department of Anaesthesiology research committee, Cairo University (Approval No. MS-47-2018). Signed written informed consents were obtained from all patients before they were enrolled into the study. The study was registered under number of (NCT05123521) at clinicaltrials.gov.

Patients included in the study were among those who had presented to the General Surgery or Orthopaedics Departments during the aforementioned 6-month period. Inclusion criteria were as follows: (i) male or female patients classified as American Society of Anaesthesiologists (ASA) physical status I or II; (ii) patients between 18 and 60 years of age; and (iii) patients scheduled for an elective surgery. Patients excluded from the study included those admitted for an emergency surgery; those with disturbed conscious levels or a history of psychological illness; and those who refused to give consent. For those patients who were to be included in the study, a detailed explanation of the purpose of the study assurances as to confidentiality of their data was given. Patients then signed informed written consent.

On the day of surgery, patients were met at a *pre-anaesthesia room* one hour before the scheduled procedure. Their full histories were revised. Results of the following investigations were checked and recorded: complete blood counts, prothrombin time and concentration, partial thromboplastin time, liver function tests, and kidney function tests.3

Patients were asked to respond to a form (Figure 1). Data collected included age, sex, medical history, surgical history, history of any psychological illness, history of drug abuse (including the type of drug, duration of abuse, dose taken, frequency, mode of administration, and timing of the last dose).

Data collection form

Name: age: sex: ASA:

Medical history: surgical history: Psychological status

If the patient is drug abuser or not. - If yes;-

-from since? -which type of drugs?

-what is the regular dose? -How frequent?

-mode of administration? -and when did he take the last one?

operation:

of induction time at start -Drugs of induction

	Base line	3min	5min	10min	15min	30min	45min	60min
BP								
HR								

Time at the end of anesthesia:

Full recovery .....min after off of anesthesia

Intra operative opiods

Pattern of recovery by using Richmond Agitation-Sedation Scale =

Managed by:

After extubation	3min	10min	30min	2h	6h
HR					
BP					

Urine sample prosperities

Results from a rapid drug testing kits

Drug	positive
opioides	
benzodiazebin	
hashish	
tramadol	

The first time for postoperative analgesics requirement and the amount used.

Figure 1. Patient's Data collection form.

Urine samples were then collected in clean and dry containers. To ensure confidentiality, urine samples were labelled using unique code numbers that were assigned to each patient. Precipitates were allowed to settle and the clear urine was used for testing.

Urine was then tested for evidence of substance abuse using the multi-drug screen panel dip steak ABON^{tm} (Abon Biopharm (Hangzhou) CO., Ltd) (Figure 2) which is a lateral flow chromatographic immunoassay [6–8]. It allowed for qualitative detection of multiple drugs in a single run. This kit was chosen for its ability to detect the most commonly abused substances in Egypt, namely: opioids, benzodiazepines, hashish, and tramadol. A single-coloured line at region C for of a specific drug indicated a positive result, whilst two coloured lines at both regions C and T indicated a negative result. The absence of coloured lines was an indication of the invalidity of the particular kit, and the kit was discarded (Figures 2(c-e)).

On arrival to the operating theatre, each patient was connected to routine monitors (an ECG, pulse oximetry, a non-invasive blood pressure monitor, and temperature monitoring). An intravenous cannula was inserted and secured and routine pre-medications (10 mg of metoclopramide and 50 mg of ranitidine) were administrated.

Types and doses of anaesthetics administered, measurements of vital signs during surgery, as well as the length of each procedure were all diligently recorded.

Hemodynamic parameters (arterial blood pressure and heart rate) were measured 1 hour before the start of surgery as a baseline measurement. They were measured again at the induction of anaesthesia, immediately after intubation (if general anaesthesia was performed), at minutes 3, 5, and 10 and then every 15 minutes until extubation/ end of surgery. 20% changes in the haemodynamic parameters compared to the baseline preoperative level was calculated.

In patients who received general anaesthesia, the recovery time defined as the time from the end of anaesthesia until full recovery of the Consciousness level. The pattern of recovery and evidence of emergence agitation at 5 minutes post recovery (Table 1 and 2) were assessed using the Richmond Agitation-Sedation Scale (RASS) [9,10]. Lastly, any postoperative complications, including post-operative nausea and vomiting, dizziness, headache, or blurred vision, were noted.

The primary outcome of this study was to estimate the incidence of drug abusers among patients that were to undergo elective orthopaedic or general surgeries at the Cairo University Teaching Hospital during the period between August and February 2018. Assessment of the

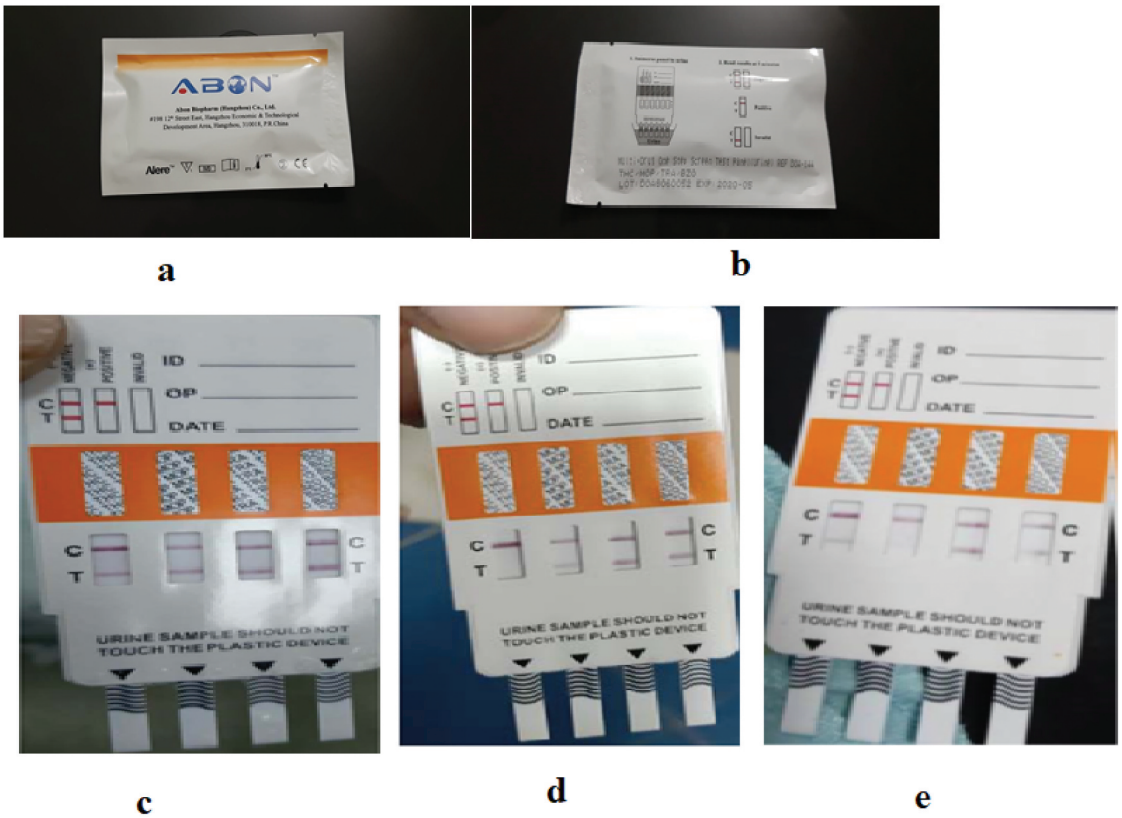

Figure 2. The multi-drug screen panel dip steak ABONtm (Abon Biopharm (Hangzhou) CO., Ltd). **a**: Front of the kit. **b**: the back of the kit. **c**: Drug test with negative results. **d**: Drug test positive for hashish. **e**: Drug test positive for opioids.

Table 1. Components of clinical recovery score.

Category	Points	Criteria
Activity	0	Unable to sit up
	1	Able to sit without assistance
	2	Able to stand without assistance
Respiration	0	Apnoea
	1	Depressed from preoperative rate
	2	Same as or more preoperative rate
Circulation	0	More than 50% decrease below the preoperative systolic BP
	1	20–50%decrease below the preoperative systolic BP
	2	Less than 20% below the preoperative systolic BP
Consciousness	0	Unresponsive to verbal stimuli
	1	Responsive to verbal stimuli
	2	Fully awake
Colour	0	Cyanotic mucous membrane
	1	Pale mucous membrane
	2	Normal coloration
Ambulation	0	Unable to walk (heel to toe along line 6 ft in length)
	1	Able to walk with assistance (heel to toe along line 6 ft in length)
	2	Able to walk without assistance (heel to toe along line 6 ft in length)
Nausea and Vomiting	0	Vomiting
	1	Nausea
	2	Minimal dizziness

Table 2. A scale for measuring the adult emergence agitation Richmond Agitation-Sedation Scale (RASS).

Score	Term	Description
+4	Combative	Overtly combative, violent, immediate danger to staff
+3	Very agitated	Pulls or removes tube(s) or a catheter(s); aggressive toward staff
+2	Agitated	Frequent no purposeful movement, patient-ventilator dys-synchrony
+1	Restless	Anxious but movements not aggressive or vigorous
0	Alert and calm	
−1	Drowsy	Not fully alert, but has sustained awakening (eye-opening/eye contact) to voice (>10 s)
−2	Light sedation	Briefly awakens with eye contact to Voice (<10 s)
−3	Moderate sedation	Movement or eye-opening to voice (But no eye contact)
−4	Deep sedation	No response to voice, but a movement or eye-opening to physical stimulation
−5	Unarousable	No response to voice or physical stimulation

pattern of recovery using the clinical recovery score (CRS) (Table 1) 5 minutes after recovery represented the most important secondary outcome [11].

3. Statistical analysis

Data were tabulated in a *Microsoft Office Excel 2010 for Windows* spreadsheet. Data were then transferred to the Statistical Package of Social Science Software program, version 23 (IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.) to be statistically analysed.

Data were presented for range, mean, and standard deviation for quantitative variables and frequencies and percentages for qualitative ones. A comparison between groups was conducted using the independent sample t-test for quantitative variables and the chi-square test for qualitative variables. P-values less than 0.05 were considered statistically significant. Finally, figures were used to illustrate key findings.

4. Results

One thousand one hundred and six patients were admitted to both the General Surgery and Orthopaedics Departments between August and February 2018. Of these, 735 patients fulfilled the inclusion criteria set for this study. Of the 735 patients, 235 patients refused to participate in the study, whilst 500 patients consented to take part in it (Figure 3). Patients' characteristics, types, and duration of surgeries and anaesthesia are presented Table 3.

Results showed evidence of drug abuse in 72 cases or 14.4% of the 500 patients who participated in the study (Figure 4). Of the 500 patients, 11.4% used hashish, making it the most commonly abused drug among patients who had participated in this study (Figure 5).

Hashish was detected in the urine of 57 or 79.16% of the 72 patients with evidence of drug abuse, followed by tramadol (34.72%), opioids (11.11%) and lastly benzodiazepines (2.7%).

In patients who received general anaesthesia, patients displaying evidence of drug abuse consumed a non-statistically significant (p-value 0.67) higher dose of intraoperative fentanyle, with mean of 103.1 ± 17.7 µg, compared with 101.8 ± 14.3 µg among those with no evidence of abuse. While regarding the total dose postoperative opioid consumption, there were statistically non-significant differences between the two groups.

Intraoperative hemodynamic changes 20% above or below the baseline were noted and recorded (Table 4). Patients who had shown evidence of drug abuse showed statistically significantly higher incidences of such changes in heart rate and systolic blood pressure compared with patients with no evidence of drug abuse.

There was a statistically significant higher incidence of agitation (as measured by the RASS) among patients with evidence of drug abuse compared with non-abusers. Agitation was more prevalent among drug abusers; with 62.5% of them scoring RASS ≥1, in comparison with 15.6% of non-abusers

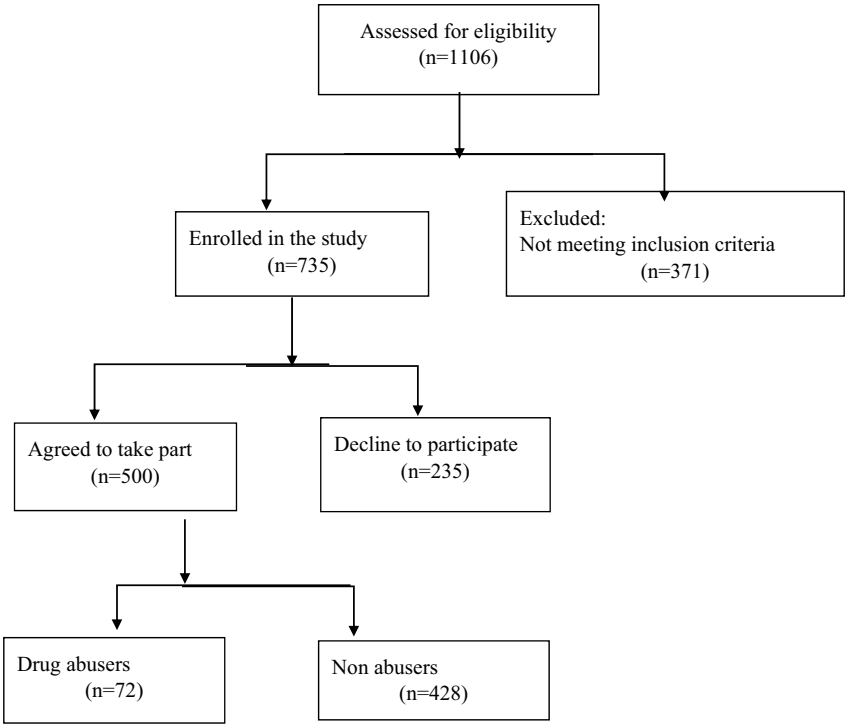

Figure 3. Consort flow chart.

Table 3. Demographic data and characteristics of patients.

		Drug abuser		P value
		Yes (n = 72)	No (n = 428)	
Type of anaesthesia	General	32 (44.4)	218 (50.9)	0.308
	Spinal	40 (55.6)	210 (49.1)	
Age		33.1 ± 10.1	38.6 ± 12	0.000*
Sex	Male	63 (87.5)	237 (55.4)	0.000*
ASA	(I)	70 (97.2)	352 (82.2)	0.000*
Co-morbidities	(Yes)	2 (2.8)	76 (17.8)	0.001*
	Diabetes Mellitus	1 (1.4)	33 (7.7)	0.045*
	Hypertension	0 (0)	32 (7.5)	0.009*
	Hepatic	0 (0)	7 (1.6)	0.601
	Rheumatic heart	0 (0)	7 (1.6)	0.601
	Endocrinal disorder	1 (1.4)	11 (2.6)	0.545
	Rheumatoid arthritis	0 (0)	5 (1.2)	0.357
Operation type	General surgery	13 (18.1)	223 (52.1)	0.000*
	Orthopedic	44 (61.1)	161 (37.6)	0.000*
	Vascular	10 (13.9)	30 (7)	0.04*
	Plastic	5 (6.9)	14 (3.3)	0.172
Duration of surgery (hrs.)		2.7 ± 0.6	2.4 ± 0.8	0.020*

Data of sex, ASA, co-morbidities, type of anesthesia and type of surgeries are presented as number (%). Data of age and duration of surgeries are presented as mean± standard deviation. P-value <0.05 considered significant (*). Yes = drug abuser, No = drug non abuser

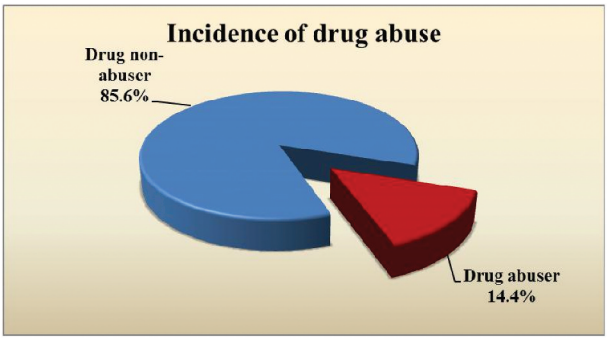

Figure 4. Percentage of drug abusers.

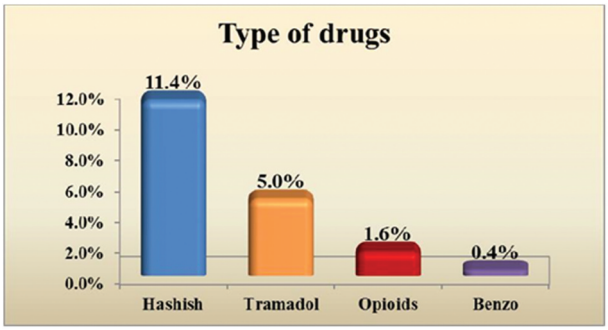

Figure 5. Prevalence of abused drugs.

Table 4. Intra-operative hemodynamic changes.

	Drug abusers (n = 72)	Non abusers (n = 428)	P value
Intra-operative hypotension	11(34.45)	94(43.1)	0.349
Intra-operative hypertension	21(65.6)	56(25.7)	0.000*
Intra-operative tachycardia	21(65.6)	88(40.4)	0.007*
Intra-operative bradycardia	9(28.1)	93(42.7)	0118

Data are presented as "number (%)"; P-value <0.05 considered significant (*)

Similarly, average values of the clinical recovery score (CRS) were statistically significantly lower among patients with evidence of drug abuse, compared with those with no such evidence. The recovery time was non-significantly higher in drug abusers. Whilst, these findings were not deemed to be of clinical value (Table 5).

Table 5. Recovery time, RASS score and CRS for patients who received general anaesthesia.

	Drug abusers (n = 32)	Non abusers (n = 218)	P value
Recovery time(minutes)	13 ± 3.6	12.4 ± 4.6	0.477
RASS score:			
Sedation	7 (21.9)	77 (35.3)	0.133
Normal	5 (15.6)	107 (49.1)	0.000 *
Agitation	20 (62.5)	34 (15.6)	0.000*
CRS (mean ±SD)	8 ± 2.7	9 ± 1.6	0.041*

Data of RASS are presented as number (%). Recovery time and CRS are presented as mean ± SD (standard deviation). P-value <0.05 considered significant (*) RASS: Richmond agitation sedation scale. CRS: clinical recovery score

5. Discussion

This constitutes the first study at the Cairo University Teaching Hospital (Kasr Al-Ainy) that examined patient data collected in relation to both general and orthopaedic surgeries, with a wide age range represented.

Of the patients who had agreed to participate in the study, 14.4% of showed evidence of drug abuse, with the apparent prevalence of abused drugs as follows: hashish (11.4%); tramadol (5%); benzodiazepines (1.6%); and morphine (0.4%).

Among the study patients, substance abuse was more common among the younger adults with mean age of 33 years. Young adults also represent the bulk any country's workforce. One could also argue that the young are more emotionally fragile and lack the life experience to properly handle stress and thus are more liable to drug abuse and addiction. We believe that the stresses of life experienced by young adults and their inability sometimes to cope with difficulties may play a role in the initiation and potentiation of the problem of substance use and abuse.

More males (63%) than females (37%) within the study group showed evidence of drug abuse. This may be explained by the varied mechanism by which each sex generally handles stress, with internalising behaviours, anxiety and depression more prevalent among females, and externalizing behaviours, substance abuse and aggression among males [12].

Another factor that may determine the high prevalence of the drug abusers is the type of surgery, as 61.6% of patients that showed evidence of drug abuse were to undergo orthopaedic surgeries, while the majority of those with no such evidence were to undergo some type of general surgery (52.5%). It is also worth noting that the younger more vulnerable age groups are generally more likely to undergo orthopaedic surgeries. These types of surgeries are lengthy and painful procedures that may push the patients to abuse drugs in advance to overcome their fear of pain.

On the other hand, the type of surgery may be a result, and not the cause. Substance abuse exposes abusers and addicts to the higher likelihood of trauma and injury. This could be a true warning sign, as most of road traffic accidents and the related orthopaedic injuries may be both directly and indirectly related to drug-abuse.

There were no noted differences between patients with evidence of drug abuse and those who showed no such evidence with regards to recovery. Both groups of patients needed the same average time interval to recover from anaesthesia after discontinuation. All patients regained normal cognitive status before their discharge from the post-anaesthesia care unit (PACU). There were likewise no statistically significant differences in the amounts of post-surgical opioid consumption between the two groups. Agitation, however, was more prevalent among those who showed evidence of drug abuse; with 62.5% of them scoring an RASS ≥1, in comparison with 15.6% of "non-abusers". This agitation manifested in the form of attempts at self-extubation. Agitation comes with health risks to patients and additional burdens upon attending staff as it is often that two to three members of the staff are required to control the patient.

The above findings corollate well with the currently known socio-demographic indicators of substance use and abuse in Egypt [13–15] In one report, cannabis was found to be the most commonly abused substance in Egypt, with evidence of cannabis abuse in 15.91% of the whole sample screened. The same study reported a percentage of 4.3% in the whole of North Africa.

One of the most interesting studies that screened a set of patients for evidence of drug abuse was conducted at the emergency department of a hospital in the eastern part of the Nile Delta [14] which served a rural area. The percentage of patients with evidence of drug abuse stood at 11.5% of the sample studied. Again, hashish was the most prevalent drug abused, followed by tramadol. The results of this study, when compared with our results, seem to suggest a higher prevalence of drug abuse in urban areas compared with rural areas of Egypt.

Rabie M. et al. [16] demonstrated increased incidence of substance abuse among adolescents especially males in Egypt. After the exclusion of nicotine, benzodiazepines were the commonest substance (5.1%), while Cannabis abuse occurred in 2.6%.

Hashim A. et al. [17] studied the prevalence of drug abuse in 558 undergraduate students in 5 non-medical colleges of Ain Shams University demonstrating that 51 students were marijuana smokers, 45 on cannabis and 38 were Strox smokers with increased substance abuse among male students.

Another study raised an important issue regarding a significant increase in drug abuse among Egyptian university students. Among the study participants, 4.9% of them reported cannabinoid abuse with representing Hashish 96.5%, Strox 41.3%, and Tramadol 31.1% [18].

Despite efforts to combat the scourge of drug abuse in Egypt through health education, detoxification, and rehabilitation, drug abuse in Egypt remains on the rise [19,20]. The socioeconomic burden of drug abuse on the Egyptian society cannot thus be underestimated.

Menendez ME. et al. [21] reported increased Opioid abuse and dependence among orthopedic surgical patients with consequent increased incidence of postoperative mental disorder, postoperative respiratory failure, surgical site infection, need for mechanical ventilation, myocardial infarction, postoperative ileus or even increased incidence of postoperative mortality.

Health workers, especially anaesthetists, should be aware of burden of drug abuse among the patient population they serve, as well as the most commonly abused drugs and their effects on patients. These may range from the mild effects on the heart or the lung up to irreversible brain damage. These adverse effects could manifest unexpectedly while the patient is under anaesthesia. Drugs of abuse may also harm the anaesthetised patient through drug-to-drug interactions with the administered anaesthetics [22].

5.1. Limitations

Although every attempt was made on the part of the study team, privacy and confidentiality of patient data could not be fully guaranteed. Moreover, the study was not blind, leading to a high index of bias during the follow-up of patients while under anaesthesia and during recovery. Also, only the most commonly abused drugs in Egypt were tested for, and not all substances of abuse. Lastly, the percentage of substance abuse among those patients who refused to take part in the study could not obviously be assessed. Some of them may have possibly refused to participate for fear that their drug abuse would be discovered. This created a significant data limitation that reduced the generalisability of the study results.

6. Conclusion

Within the study group, cannabinoids were the most frequent substance of abuse, followed by tramadol and then other opioids. This report offers evidence of a significant prevalence of substance abuse in patients scheduled for surgeries at the Cairo University Teaching Hospital (Kasr Al-Ainy).

Our recommendation is to consider screening tests for substance abuse as a routine preoperative investigation.

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Availability of data and material

Data are available from the authors upon reasonable request after permission of Cairo University.

Consent for publication

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