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Retrospective study of addictive drug-induced acute toxicity of cases admitted to the Poison Control Centre of Ain Shams University Hospital (2015–2016)

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Abstract

Background: The acute toxicity with addictive drugs is one of the most common problems in the emergency department. This is a global problem affecting societies as it deals with young people at the age of work and productivity. This study aims to recognize the prevalence of addictive drug-induced acute toxicity regarding socio-demographic factors, common clinical presentation, and outcome of management.

Methods: This is a descriptive retrospective study conducted on patients admitted to the Poison Control Centre of Ain Shams University Hospital during the period between the start of January 2015 and the end of December 2016. The total number of cases was 803 cases collected and analyzed regarding the socio-demographic data, condition of poisoning, prevalence of addictive drugs, route of intake, common clinical presentation, management plan, and final outcome of management. Data was analyzed using the computer software package SPSS 22.

Results: A total of 803 cases were reviewed, their age ranged from 1 month to 83 years with mean \pm SD 21.6 ± 16.8 years, and most cases were male (72.9%), living in urban areas (67.4%), and of single marital status (66.6%). Accidental overdose characterized most (86.8%) cases. Tramadol was the most commonly abused drug (36.5%), and most of the drugs were ingested orally. Disturbed conscious level was the most common clinical presentation in all drugs, and most of the cases were vitally stable and had normal sodium, potassium, ABG, and blood glucose level. Most of the cases received medical treatment in ICU (60%) and 93.5% improved while 6.5% died.

Conclusions: Drug abuse is a serious problem in many countries especially among young males. Tramadol abuse and toxicity is increasing every day in the Egyptian community. Like other cases of poisoning, treatment of acute toxicity with addictive drugs is mainly supportive and symptomatic.

Keywords: Acute, Poisoning, Addictive drugs, Egypt, Drug abuse

Highlights

This study was done for:

- Assessment of the incidence of toxicity from addictive drugs in Egypt during the years between the start of 2015 and the end of 2016.
- To give an idea about some demographic data (age, sex, residence, and marital status).

- To determine the frequency of abused drugs, condition of poisoning, common clinical presentations, management plan, and final outcome of the management of cases.

Background

Drug abuse is considered a global and growing problem in the whole world. The popularity of many synthetic drugs has raised over the past years, and their use often shows up on the scene rapidly (Pompei et al., 2016).

In Egypt, we are not away from the problem. Many studies have revealed increases in the prevalence of the

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use of tobacco, illicit drugs, and over-the-counter drugs, especially between youth (Loffredo et al., 2015).

The pattern of toxicity usually differs between centers of different countries; however, the annual incidence of human toxicity continues to increase worldwide (Kaya et al., 2015).

Aim of the work

The aim of the study was to assess the incidence of toxicity from addictive drugs in Egypt during the years between the start of 2015 till the end of 2016, to give an idea about some demographic data (age, sex, residence, and marital status), and to determine the frequency of toxicity from abused drugs, condition of poisoning, common clinical presentations, severity of the condition, management plan, and final outcome of the management of cases.

Subjects and methods

This is a descriptive retrospective study for statistical purposes. Data of all addictive drug-induced acute toxicity cases (the total number of cases was 803), who were admitted to the Poison Control Centre of Ain Shams University Hospital from the start of January 2015 till the end of December 2016, were collected and analyzed. Data was collected after obtaining consent from the chef of the PCC of ASUH and from the ethical committee of scientific research, Faculty of Medicine, Beni-Suef University.

The diagnosis was based on the following:

Upon arrival to the emergency room, a detailed history was obtained and full physical examination was performed. An IV line was inserted and a blood sample was obtained for routine investigations including ABG, serum electrolytes, and blood glucose level. Urine samples were requested for the detection of drugs using a sterile plastic cup under observation. If the patient presented with disturbed conscious level, a urinary catheter was inserted for sampling. The sample was transferred immediately to the Toxi-Lab for screening using immunoassay techniques (rapid card test and auto-analyzer device). Confirmation was performed using high-performance liquid chromatography (HPLC) and gas chromatography-mass spectrometry (GC-MS) for qualitative and quantitative analysis.

For cases presented with alcohol toxicity, total alcohol, ethanol, and methanol blood levels were all done and management was according to the case. For analysis of alcohol, blood samples were collected from the suspected patients. Samples were analyzed using micro-diffusion in special flasks and chemical oxidation with a mixture of potassium dichromate and sulfuric acid in excess. The amount of oxidizing agent used up in the oxidation reaction was determined by iodometric titration with sodium thiosulfate and a starch indicator. The quantitative analysis of alcohol was achieved by headspace gas chromatography

(HS-GC) with automated sampling with a flame ionization detector (FID).

This study includes socio-demographic data collected from *the history* (age, sex, residence, marital status), relation between poisoning cases and studied years, *seasonal variation* (summer between 22 June and 22 September, autumn between 23 September and 20 December, winter between 21 December and 20 March, and spring between 21 March and 21 June), mode of toxicity, incidence of addictive drug-induced acute toxicity, route of intake, *Clinical manifestations* (vital signs, clinical manifestations), routine investigations (serum sodium, serum potassium, blood glucose level, and arterial blood gases (ABG)), place of admission and management plan (supportive and symptomatic treatment, elimination of the poison from the body, and the use of physiological antidote), and outcome of management.

Statistical analysis

The collected data were organized, tabulated, and statistically analyzed using the computer software package SPSS 22. Number and percentages were presented for quantitative variables. Chi-square and Fisher's exact tests were used to estimate differences in qualitative variables. *P* value showed significance below 0.05.

Results

Demographic and epidemiological data of patients under the study (Table 1 and Figs. 1, 2, and 3)

The ages of the studied cases ranged from 1 month to 83 years with mean \pm SD 21.6 \pm 16.8 years. There is a significant statistical increase in the number of male cases (72.9%) than females (27.1%). Most of the cases were in urban areas (67.4%) while 32.6% were in rural

Table 1 Demographic characteristics of patients under the study

Variables	Number	Percent (%)
Age		
Mean \pm SD	21.6 \pm 16.8	
Range	1 month to 83 years	
Sex		
Male	585	72.9
Female	218	27.1
Residence		
Urban	541	67.4
Rural	262	32.6
Marital status		
Single	535	66.6
Married	240	29.9
Widowed/divorced	28	3.5

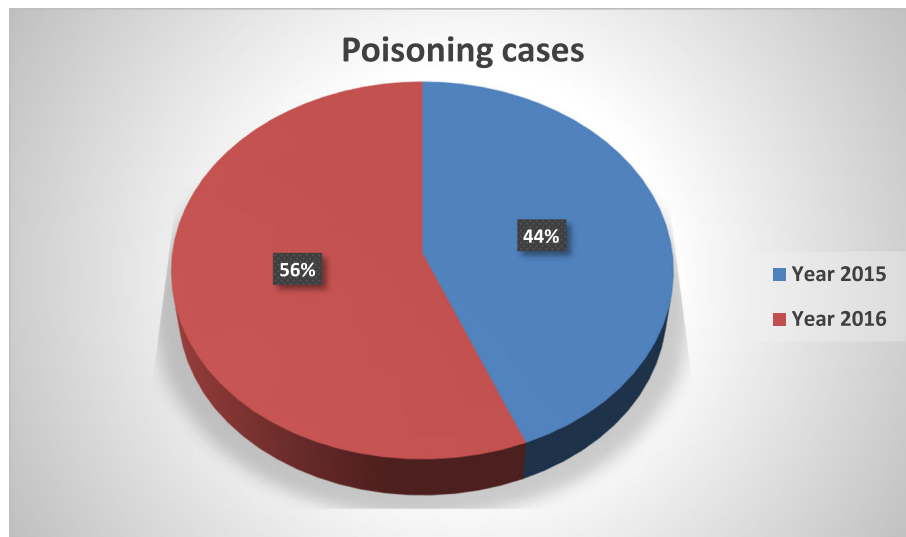


Fig. 1 Chart showing the correlation between poisoning cases and the studied year

areas. Most of the cases were of a single marital status (66.6%) while 29.9% were married and 3.5% were widowed or divorced. There was an increase in the number of poisoning cases representing 44% in 2015 and 56% in 2016. The incidence of toxicity increased for all drugs except cannabis and BZs for which the incidence in 2015 was higher than in 2016. Regarding the seasonal variation, most of the toxicity cases were during summer (30%) followed by spring (26%) and then autumn and winter (24% and 20%, respectively).

Toxicological results of addictive drugs involved in poisoning (Table 2, Figs. 4 and 5)

The majority of cases were accidental (86.8%) either due to drugs taken by a mistake or overdose from patients with recreational abuse. Suicidal poisoning was in 13.2% only. It was found that the most prevalent addictive drug involved in poisoning was tramadol (36.5%) followed by cannabis (22.8%) and then benzodiazepines (11.7%). In combined toxicity, tramadol and opiates were the most common (6.4%) followed by tramadol and BZs (2%) and then tramadol and cannabis (1.5%). The most common

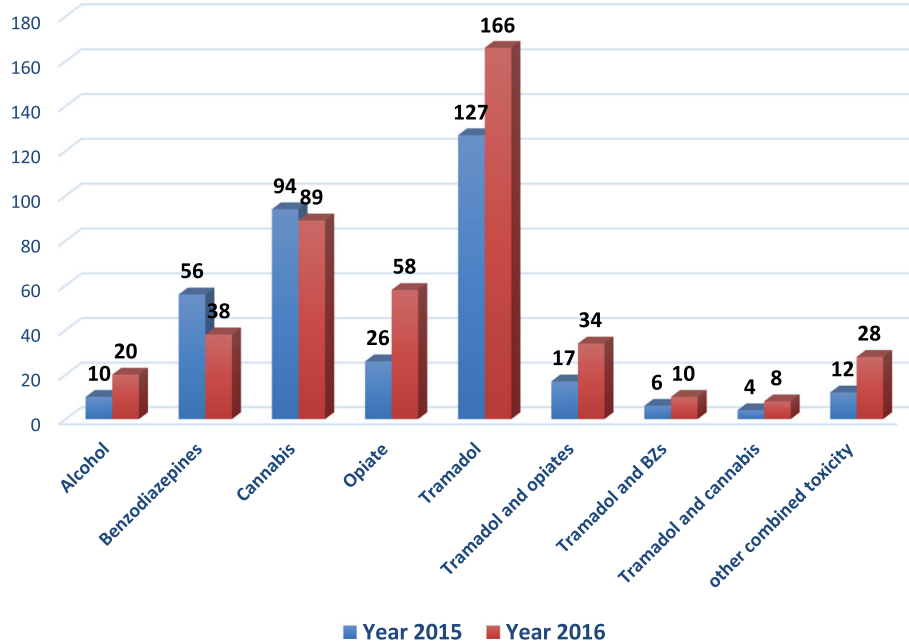


Fig. 2 Chart showing the correlation between the type of the drug and the studied year

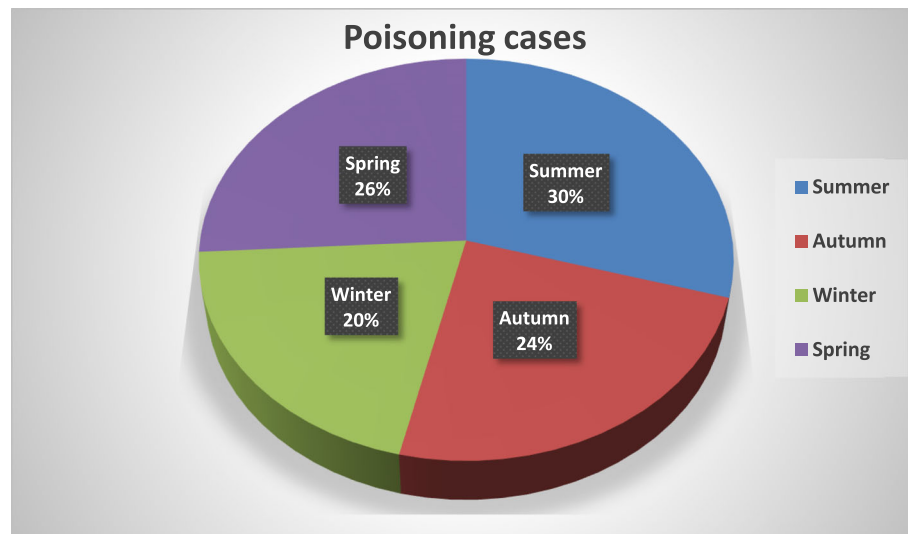


Fig. 3 Chart showing the seasonal variation of the poisoning cases

route of intake was oral (82.1%) followed by inhalation (10.7%) and then parenteral (7.6%).

Management of addictive drug-induced acute toxicity in patients under the study (Tables 3, 4, 5, 6, 7, 8, and 9)

Most of the patients were vitally stable on admission. Only 13.3% had tachycardia, 1.1% bradycardia, 2% hypertension, 6% hypotension, 1% tachypnea, and 8.5% bradypnea. Regarding the clinical manifestations, the most common clinical presentation was DCL (68.6%). Cyanosis was in 6.6% of patients, GIT upset 10.3%, seizures 6.2%, hallucination 1.4%, disequilibrium 4.7%, agitation 6.2%, constricted pupil 30.9%, and dilated pupil 3.1%.

In alcohol-induced acute toxicity, the majority of patients were vitally stable and DCL was the most common clinical presentation (46.7%) followed by GIT upset (26.7%). Also, most of the cases of BZ overdose were vitally stable and DCL was the most common clinical finding (75.5%). Regarding cannabis toxicity, the study revealed that DCL

was the most common clinical manifestation (78.1%) followed by GIT upset and disequilibrium (3.8%). On arrival to the emergency department, most of the cases were vitally stable. However, tachycardia was observed in 22.8%. Regarding opiates, the most common clinical findings were DCL (75%) and most of the patients were vitally stable. Miosis was observed in 56% of patients and 16.7% had cyanosis. The most common toxicity was with tramadol in which DCL was the most common clinical presentation (60.4%) followed by seizures and GIT upset (15 and 12.6%, respectively). The majority of patients were vitally stable, and only 11.3% presented with tachycardia.

On arrival to the emergency room, the routine investigations were done including serum electrolytes, blood glucose level, and ABG. Regarding serum electrolytes and blood glucose level, the majority of patients had normal sodium, potassium, and blood glucose level. In alcohol overdose, hypokalemia was detected in 70% and hyperglycemia in 16.7%. BZ toxicity had no effect on sodium level; however, hypokalemia was observed in 30.9% of patients. Regarding cannabis overdose, most of the patients had normal blood glucose level and the most common electrolyte disturbance observed was hypokalemia (11.5%). Opiates overdose also had no effect on sodium level, and hypokalemia was the most common seen in 31% of patients. Also, 32.1% of patients with tramadol overdose presented with hypokalemia. Hyperglycemia and hypoglycemia were observed in 5.1% and 1%, respectively, of patients only.

The effect of addictive drug-induced acute toxicity on acid-base balance was variable. In alcohol toxicity, the most common change was metabolic acidosis (63.3%) while in BZs and cannabis overdose, most of the patients had normal ABG (79.8 and 62.3%, respectively). On the

Table 2 Toxicological results of addictive drugs involved in poisoning

Prevalence of addictive drugs	Number	Percent (%)
Alcohol	30	3.7
Benzodiazepines	94	11.7
Cannabis	183	22.8
Opiate	84	10.5
Tramadol	293	36.5
Tramadol and opiates	51	6.3
Tramadol and BZs	16	2
Tramadol and cannabis	12	1.5
Other combined toxicity	40	5

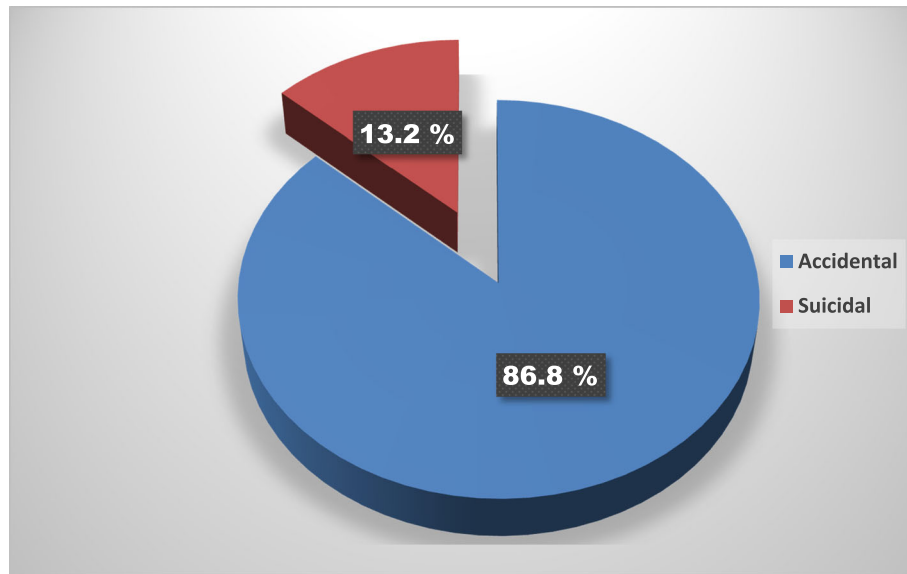


Fig. 4 Chart showing the frequency of different modes of toxicity

other hand, respiratory acidosis was the commonest change in opiates toxicity (51.2%). Regarding tramadol overdose, 44% had normal ABG and respiratory acidosis was in 26.6% of patients.

Management of patients was in the ICU, inpatient wards, or the observation room depending on their clinical presentation and their laboratory results. Sixty percent of the patients were managed in the ICU, 3.7% in the observation rooms, and 36.7% in the inpatient wards.

Treatment of addictive drug-induced acute toxicity like other toxicity depends on supportive and symptomatic ttt,

elimination of the poison from the body, and the use of antidote if available.

The majority of patients were kept under observation with supportive and symptomatic treatment. GIT decontamination was not the key role in ttt as most of the patients presented with DCL. Activated charcoal was used in 3.9% of patients, gastric lavage in 0.7%, and mechanical emesis in 0.1%. Hemodialysis was used to eliminate the poison from the blood and was used in 1.4% of patients. Regarding the antidote, atropine and toxogonin were used in 0.6% of patients who had combined toxicity

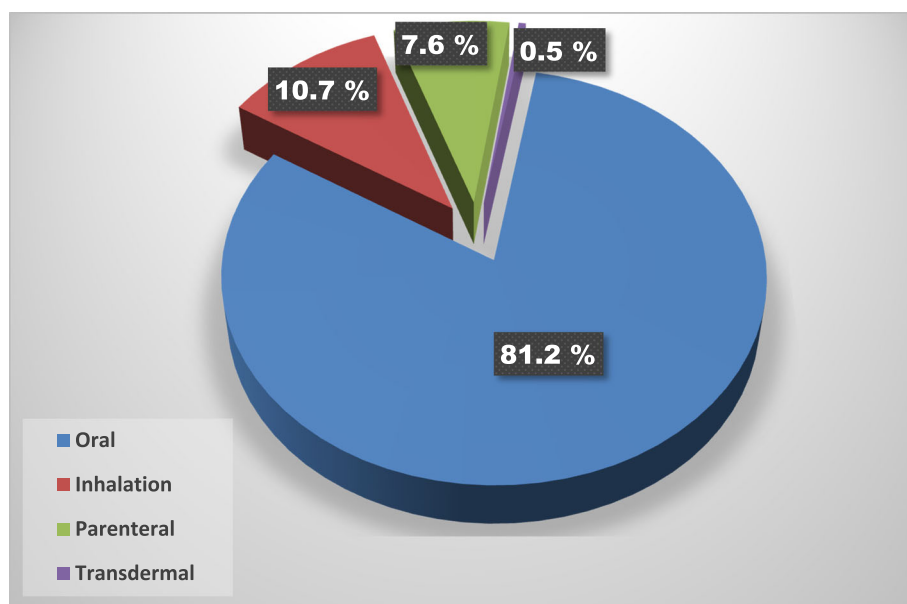


Fig. 5 Chart showing the different routes of administration of poisoning cases

Table 3 Description of vital sign among all patients with different types of poisoning

Type of poisoning	Pulse						Blood pressure						Respiratory rate					
	Normal		Increased		Decreased		Normal		Increased		Decreased		Normal		Increased		Decreased	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Alcohol	28	93.3	2	6.7	0	0	30	100	0	0	0	0	29	96.7	0	0	1	3.3
BZs	93	98.9	1	1.1	0	0	92	97.8	1	1.1	1	1.1	94	100	0	0	0	0
Cannabis	142	77.6	41	22.4	0	0	181	98.9	0	0	2	1.1	182	99.5	1	0.5	0	0
Opiate	68	81	13	15.5	3	3.5	71	84.5	4	4.8	9	10.7	61	72.6	2	2.4	21	25
Tramadol	256	87.4	33	11.3	4	1.4	265	90.4	8	2.7	20	6.9	264	90.1	3	1	26	8.9
Tramadol and opiates	41	80.4	9	17.6	1	2	38	74.5	2	3.9	11	21.6	36	70.6	1	2	14	27.4
Tramadol and BZs	15	93.8	1	6.3	0	0	16	100	0	0	0	0	15	93.8	0	0	1	6.2
Tramadol and cannabis	8	66.7	4	33.3	0	0	11	91.7	0	0	1	8.3	11	91.7	0	0	1	8.3
Other combined	36	90	3	7.5	1	2.5	35	87.5	1	2.5	4	10	35	87.5	1	2.5	4	10
Total	687	85.6	107	13.3	9	1.1	739	92	16	2	48	6	727	90.5	8	1	68	8.5
P value	0.0001						0.000006						0.00001					

with organo-phosphorus compounds. Ethanol (2%), folic acid (1.1%), naloxone (16.6%), and flumazenil were used in 2.2% of patients.

Recovery was the most common sequelae of management (93.5%) while only 6.5% died. The highest mortality was in combined toxicity (20%) followed by alcohol (13.3%) and then combined tramadol and opiate intake (11.8%). No mortality was reported with BZs, combined tramadol and BZ intake, and combined tramadol and cannabis intake.

Discussion

Nowadays, drug abuse continues to be one of the most critical threats in many countries that affect the government and the society as it mainly affects the people within the age of productivity (Arendet et al., 2011).

The present study was conducted to demonstrate the incidence of addictive drug-induced acute toxicity. Data

was retrieved from archives of the Poison Control Centre of Ain Shams University Hospital during the years between the start of 2015 and the end of 2016. It was analyzed according to age, sex, residence, marital status, modes of toxicity, frequency of abused drugs, route of intake, common clinical presentations, investigations, management plan, and final outcome.

In the present study, about 49.6% of the patient were in the age group of 18–40 years, followed by 27.5% of the patient which were in the age group of 2–18 years, which are similar to the observation of Minino, (2010) who reported drug-related problems in people aged 15–64 and most of them were in young age. This could be explained as people at the age of 18 years usually start to miss their economic and institutional safety. They also lose the protection of their parents.

The majority of cases were males (72.9%) compared to females who were 27.1% only. These results are

Table 4 Description of Clinical presentation among all patients with different types of poisoning

Type of poisoning	Skin		GIT		Neurological						Pupil				Total N				
	Cyanosis		GIT Upset		DCL		Seizures		Hallucination		Disequilibrium		Agitation			Constricted		Dilated	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%		N	%	N	%
Alcohol	0	0	8	26.7	14	46.7	0	0	0	0	1	3.3	4	13.3	0	0	3	10	30
BZs	0	0	4	4.3	71	75.5	0	0	3	3.2	6	6.4	8	8.5	17	18.1	3	3.2	94
Cannabis	2	1.1	7	3.8	143	78.1	1	0.5	0	0	7	3.8	2	1.1	13	7.1	3	1.6	183
Opiate	14	16.7	5	6	63	75	1	1.2	0	0	1	1.2	1	1.2	47	56	1	1.2	84
Tramadol	18	6.1	37	12.6	177	60.4	44	15	7	2.4	19	6.5	28	9.6	113	38.6	13	4.4	293
Tramadol and opiates	15	29.4	4	7.8	42	82.4	2	3.9	0	0	0	0	3	5.9	29	56.9	1	2	51
Tramadol and BZs	0	0	1	6.3	13	81.3	0	0	0	0	2	12.5	1	6.3	12	75	0	0	16
Tramadol and cannabis	0	0	5	41.7	7	58.3	0	0	0	0	2	16.7	0	0	3	25	0	0	12
Other combined	4	10	12	30	21	52.5	2	5	1	2.5	0	0	3	7.5	14	35	1	2.5	40
Total	53	6.6	83	10.3	551	68.6	50	6.2	11	1.4	38	4.7	50	6.2	248	30.9	25	3.1	803

Table 5 The effect of addictive drug-induced acute toxicity on serum electrolytes and blood glucose level among patients under the study

Type of poisoning	Sodium						Potassium						Blood Glucose					
	Normal		Increased		Decreased		Normal		Increased		Decreased		Normal		Increased		Decreased	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Alcohol	29	96.7	0	0	1	3.3	9	30	0	0	21	70	25	83.3	5	16.7	0	0
BZs	94	100	0	0	0	0	65	69.1	0	0	29	30.9	91	96.8	2	2.1	1	1.1
Cannabis	182	99.5	0	0	1	0.5	161	88	1	0.5	21	11.5	179	97.8	2	1.1	2	1.1
Opiate	84	100	0	0	0	0	56	66.7	2	2.3	26	31	75	89.3	7	8.3	2	2.4
Tramadol	288	98.3	2	0.7	3	1	194	66.2	5	1.7	94	32.1	275	93.9	15	5.1	3	1
Tramadol and opiates	50	98	0	0	1	2	33	64.7	2	3.9	16	31.4	46	90.2	3	5.9	2	3.9
Tramadol and BZs	15	93.7	0	0	1	6.3	13	31.2	0	0	3	18.8	14	87.5	2	12.5	0	0
Tramadol and cannabis	12	100	0	0	0	0	6	50	0	0	6	50	12	100	0	0	0	0
Other combination	40	100	0	0	0	0	23	57.5	2	5	15	37.5	32	80	4	20	4	20
Total	794	98.9	2	0.2	7	0.9	560	69.7	12	1.5	231	28.8	749	93.3	40	5	14	1.7
P value	0.601						0.000001						0.0001					

approximately similar to El-Sawy et al., (2010) who revealed that males are more likely to immerse in drugs as their friends usually offer them drugs to feel that they are doing unusual acts or just to imitate others. On the other hand, females usually resist the offer when facing the same conditions.

Regarding their residence, 67.4% of cases were living in the urban area and 32.6% of cases were living in rural area. The importance of the residence is to study the relation between the residence (as a pointer for the socio-economic level) and drug abuse. This is in agreement with Sundquist et al., (2016) who reported in their study that drug abuse was more common in urban areas like large- and medium-sized cities but less frequent in rural and small cities.

Most of the cases were single (66.6%) followed by married (29.9%) and then widowed or divorced (3.5%). Similar studies in Egypt were done by Boulos et al., (2013)

and El-Sawy et al., (2010) reported that most of the drug abusers were of a single marital status.

The incidence of toxicity in 2016 was higher than in 2015 for all drugs except cannabis and BZs for which the incidence in 2015 was higher than in 2016. Regarding the seasonal variation, most of the toxicity cases were during summer (30%) followed by spring (26%) and then autumn and winter (24% and 20%, respectively). Bakhaidar et al., (2015) reported approximately similar results in their study of the pattern of drug overdose in Saudi Arabia. They reported that summer time was the most common season for poisoning (38.8%), and the annual incidence of cases was approximately uniform throughout the years from 2009 to 2012 while there were a relatively lower number of cases during the year 2008.

The majority of poisoning was accidental overdose (86.8%) followed by suicidal intake (12.2%). Accidental drug poisoning may be due to overdose from recreational

Table 6 The effect of addictive drug-induced acute toxicity on ABG of patients under the study

Types of poisoning	ABG								Total	P value
	Normal		Respiratory acidosis		Metabolic acidosis		Respiratory alkalosis			
	N	%	N	%	N	%	N	%		
Alcohol	6	20	5	16.7	19	63.3	0	0	30	0.00009
BZs	75	79.8	8	8.5	8	8.5	3	3.2	94	
Cannabis	114	62.3	18	9.8	47	25.7	4	2.2	183	
Opiate	27	32.1	43	51.2	12	14.3	2	2.4	84	
Tramadol	129	44	78	26.6	75	25.6	11	3.8	293	
Tramadol and opiates	17	33.3	27	51	5	9.8	2	3.9	51	
Tramadol and BZs	11	68.8	3	18.8	2	12.5	0	0	16	
Tramadol and cannabis	8	66.6	2	16.7	0	0	2	16.7	12	
Other combined toxicity	21	52.5	8	20	11	27.5	0	0	40	
Total	408	50.8	189	23.5	179	22.4	23	2.9	803	

Table 7 The treatment of addictive drug-induced acute toxicity of patients under the study

Management plan	Number	Percent (%)
Airway and breathing		
Oxygen	172	21.4
Nebulizers	25	3.1
Mechanical ventilation	135	16.8
Airway tube and suction	1	0.1
ETT	163	20.3
AMBU resuscitation	2	0.2
Circulation		
IV fluids	803	100
Steroids	56	7
Dopamine	21	2.6
Symptomatic		
Antibiotics	7	0.9
Anti-emetics	7	0.9
H2 blockers	49	6.1
Bicarbonate	15	1.9
Sedative hypnotics	96	12
Epanutin	1	0.1
Mannitol	3	0.4
Elimination of the drug		
Activated charcoal	31	3.9
Mechanical emesis	1	0.1
Gastric lavage	6	0.7
Hemodialysis	11	1.4
Antidote		
Atropine	5	0.6
Toxogonin	5	0.6
Ethanol	16	2
Naloxone	133	16.6
Flumazenil	18	2.2
Folic acid	9	1.1

drug abuse or drugs taken by mistake especially in children or therapeutic overdose. This result agrees with Valersnes et al., (2016) who reported that about 94% of cases were accidental poisoning and about 4% were suicidal at the Oslo Emergency Outpatient Clinic in Norway. Pritchard and Amanullah (2007) demonstrated that the low incidence of suicide in Islamic countries could be due to the fact that it is forbidden in the Quran and attributed to religious beliefs in contrast to the studies in various European countries that found increased suicidal risk among abusers (Bohnert et al., 2010).

It was found that the most common drug was tramadol (36.5%) followed by cannabis (22.8%) and then

benzodiazepines (11.7%). These results are approximately similar to a study performed by Ghanem et al., (2005) who reported in their study that cannabinoids were the main psychoactive substance (19%) followed by opiates (16%) and then benzodiazepines (12%). They did not test for tramadol perhaps due to the lack of interest about it at that time. Nazarzadeh et al., (2014) and Lord et al., (2011) reported a significant increase in the prevalence of tramadol abuse over the last decade. Amr et al., (2014) explained this as moral, cultural, societal, and legal restrictions on individuals towards alcohol, and drug use may prevent some people from searching for treatment, so the prevalence rates may be not fully representative of the problem.

The study revealed that the most common route of intake was oral (82.1%) followed by inhalation (10.2%). Forrester, (2017) reported in his study that ingestion was the commonest route of administration (82.1%) and in the annual report of Ain Shams Poison Control Centre El Masry and Tawfik, (2013) reported that ingestion was the most common route of administration was (94.9%) followed by inhalation (2.7%).

The clinical presentation varies according to the type of the drug, route of intake, dose, and delay of time of presentation. The most common clinical presentation was disturbed conscious level, and most of the patients were vitally stable on admission.

Saalfeld and Spear (2014) stated that the heart rates are sensitive to alcohol which in acute toxicity may increase the heart rate but in large doses may decrease the heart rate. Karayel et al., (2010) demonstrated the most common clinical presentation of alcohol overdose being nausea, vomiting, abdominal pain, visual disturbances, and disturbed conscious level within 12 to 24 h latent period.

The main presentation of a patient with acute toxicity of benzodiazepines alone is CNS depression with normal vital signs (Ho et al., 2015).

Hartman and Huestis (2013) revealed that the effects of cannabis toxicity vary with dose, route of intake, and expectations of effects. Patients present with symptoms of lethargy, coma, ataxia, and vomiting (Lovecchio and Heise 2015).

The classical presentation of the opioid toxidrome includes coma, cyanosis, and constricted pupils (Cobaugh et al., 2014).

Salmi (2016) and Beakley et al., (2015) reported that tramadol overdose may induce CNS and respiratory depression, nausea and vomiting, tachycardia, and seizures.

On arrival to the emergency room, the routine investigations were done including serum electrolytes, blood glucose level, and ABG. Regarding serum electrolytes and blood glucose level, the majority of patients had normal sodium, potassium, and blood glucose level. Hypokalemia was detected in 28.8%.

Table 8 Different sites of patient admission among each type of poisoning

Types of poisoning	Patient orientation						Total	P value
	ICU		Observation		Inpatient			
	N	%	N	%	N	%		
Alcohol	28	93.3	0	0	2	6.7	30	0.00001
BZs	41	43.6	8	8.5	45	47.9	94	
Cannabis	22	12	8	4.4	153	83.6	183	
Opiate	75	89.3	2	2.4	7	8.3	84	
Tramadol	224	76.5	6	2	63	21.5	293	
Tramadol and opiates	44	86.3	1	2	6	11.8	51	
Tramadol and BZs	11	68.8	1	6.3	4	25	16	
Tramadol and cannabis	7	58.3	0	0	5	41.7	12	
Other combined toxicity	30	75	4	10	6	15	40	
Total	482	60	30	3.7	291	36.3	803	

Grueffner et al., (2015) reported that most of the patients with alcohol overdose had normal serum sodium, potassium, and blood glucose levels. Kazemzadeh et al., (2014) reported that benzodiazepine overdose has minimal effect on serum electrolytes like sodium and potassium.

Electrolyte disturbances detected in cannabis users include hypokalemia which may result from heavy carbohydrate consumption during intoxication, leading to higher insulin levels and intracellular shift of potassium. Hypokalemia may also be potentiated by vomiting (Meznar et al., 2016 and Bui et al., 2015).

In general, hypokalemia may occur secondary to multiple causes like GIT irritation, compensatory respiratory alkalosis, and bicarbonate therapy (Shah et al., 2012).

The effect of addictive drug-induced acute toxicity on acid-base balance was variable. In alcohol toxicity, the most common change was metabolic acidosis (63.3%) while in BZs and cannabis overdose, most of the patients had normal ABG (79.8 and 62.3%, respectively). On the

other hand, respiratory acidosis was the commonest change in opiates toxicity (51.2%). Regarding tramadol overdose, 44% had normal ABG and respiratory acidosis was in 26.6% of patients.

Metabolic acidosis in alcohol toxicity could be attributed to formic acid accumulation and lactic acidosis as a result of impairment of cellular respiration by formate or increased generation of NADH during the metabolism of methanol (Paasma et al., 2009).

Borron (2016) reported that respiratory alkalosis and acidosis are related to increased and decreased ventilation. Opiates and BZs decrease the respiratory rate by depressing the central respiratory and brainstem regulatory centers.

According to medical treatment provided to the patients according to the place of admission, the study revealed that most patients received medical treatment in the intensive care unit (60%) followed by the inpatient wards and observation rooms (36.7 and 3.7%, respectively). The decision whether to admit in ICU or inpatient wards vary according to the clinical condition of the patient and his laboratory findings. These results agreed to that reported by Amr et al., (2014) who revealed that most of the patients were admitted to the intensive care unit.

Management of addictive drug-induced acute toxicity like other toxicity depends on supportive and symptomatic treatment, elimination of the poison from the body, and the use of antidote if available.

Protection of the airway, breathing, and maintenance of circulation was the main role of management in addition to the symptomatic treatment. In agreement with the results, Vale and Bradberry (2016) reported that initial management involves the treatment of any life-threatening conditions like airway compromise, difficult breathing, hemodynamic instability, and serious dysrhythmias.

Table 9 The relation between the fate of patients and different types of poisoning

Types of poisoning	Death				Total	P value
	No		Yes			
	N	%	N	%		
Alcohol	26	86.7	4	13.3	30	0.00005
BZs	94	100	0	0	94	
Cannabis	182	99.5	1	0.5	183	
Opiate	77	91.7	7	8.3	84	
Tramadol	267	91.1	26	8.9	293	
Tramadol and opiates	45	88.2	6	11.8	51	
Tramadol and BZs	16	100	0	0	16	
Tramadol and cannabis	12	100	0	0	12	
Other combined toxicity	32	80	8	20	40	
Total	751	93.5	52	6.5	803	

GIT decontamination was not the key role in ttt as most of the patients presented with DCL. Activated charcoal was used in 3.9% of patients, gastric lavage (0.7%), and mechanical emesis in 0.1%. Hemodialysis was used to eliminate the poison from the blood and used in 1.4% of patients. This could be explained by Kraut and Kurtz (2008) who reported that gastric lavage, emesis, or activated charcoal must be applied within 30 to 60 min of ingestion to be effective.

Regarding the use of *physiological antidote*, ethanol was used in 2% and folic acid in 1.1% used in treatment of alcohol toxicity. Naloxone was used in 16.6% and flumazenil was used in 2.2% of patients with opiates or tramadol and BZ toxicity. Atropine and toxogonin were used in 0.6% of patients with combined toxicity with organo-phosphorus compounds.

Barceloux et al., (2002) reported that ethanol has never been approved by the Food and Drug Administration as an antidote for alcohol toxicity. However, it was used in the treatment of methanol and ethylene glycol overdose for many years (Chu et al., 2002).

Flumazenil is a specific antagonist of benzodiazepine, but it has limited indications as it has many side effects like cardiac complications and seizure, especially in mixed poisoning with other drugs (Dear and Bateman 2016).

Sivilotti (2015) reported that naloxone can be used for diagnostic or therapeutic purposes for opiates. It can reverse the respiratory depression caused by natural opiate or synthetic opioids.

According to the prognosis and the final outcome of management, the total number of cases admitted to the PCC of Ain Shams University Hospital was 803 cases; 93.5% improved when received medical treatment and discharged while 6.5% died. The highest mortality was in combined toxicity (20%) followed by alcohol (13.3%) and then combined tramadol and opiates toxicity (11.8%). Mortality was nearly similar in tramadol and opiates (8.9 and 8.3%, respectively). One case was recorded with cannabis overdose. This case was a 2-year-old male patient presented to the PCC of Ain Shams University hospitals with disturbed conscious level, tachycardia, and GIT upset. History revealed ingestion of cannabis. ABG, serum electrolytes, and blood glucose level all were normal. Drug screening results were positive for cannabis. The patient was admitted to the ICU based on the conscious level. The patient acquired pneumonia in the ICU which was the cause of death.

In alcohol toxicity, Shadnia et al., (2013) agree with the results of this study. They reported death in 30% of patients. These results agreed with the studies performed by Lee et al., (2014) who reported that mortality due to BZ toxicity was 1.4%, 2.4%, and 0%. Also, Dines et al., (2015) reported that cannabis alone with no co-ingested drugs was the cause of death in 2.8% of patients.

Regarding opiate-related deaths, the results are approximately similar to that reported by Morizio et al., (2017) who reported that mortality was 4.2%. In tramadol-related death, Mood et al., (2011) reported in their study that the mortality rate was (1.1%) and the rest were discharged with a full recovery.

Conclusions

Drug abuse and addiction is one of the problems that raised on the scene rapidly. It has many effects on the people, not only on the abusers but also on their family and the society. One of the main problems of addictive drugs is acute toxicity which was detected in all age groups including children and even infants who usually imitate their parents or due to the hand to mouth behavior of infants. Of all drugs, tramadol has become the first drug involved in poisoning among Egyptian populations in the last years. For management of toxicity, supportive and symptomatic treatment is still the main method for management with limited indications for the use of antidotes.

Abbreviations

ABG: Arterial blood gases; ASUH: Ain Shams University Hospitals; BZs: Benzodiazepines; CNS: Central nervous system; DCL: Disturbed conscious level; GIT: Gastro-intestinal tract; ICU: Intensive care unit; PCC: Poison Control Centre; SD: Standard deviation

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