

CROSS SECTIONAL STUDY OF ACUTE TOXICITY CAUSED BY ANTI DIABETIC DRUGS IN PATIENTS PRESENTING TO POISONING CENTER DURING 2022

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ABSTRACT

Background: Toxicity from anti diabetic drugs may occur for many reasons accidental and suicidal. Some patients deliberately overdose on medications. In other cases, therapeutic misadventures and medication administration errors cause unintentional poisoning.

Aim of the work: The aim of this study is to identify the incidence of antidiabetic drugs acute toxicity in patients presented to National Environmental and Clinical Toxicology and Research Center, Cairo university “Cairo and Giza governorates”, During 2022 (From January to December 2022). To give an idea about demographic data (age, sex, residence, and marital status), circumstances of toxicity, common clinical presentations, severity of the toxicity, management plan and final outcome. **Subjects and Methods:** The study included 100 cases who were admitted at NECTR during 2022. Cases were analyzed regarding demographic data, circumstances of toxicity, common clinical presentations, severity of the toxicity, management plan, and final outcome. **Results:** The most common types of antidiabetic drugs toxicity are biguanides and insulin. Most cases were not diabetic, were suicidal attempts, stayed from 24 to 72 hours in the hospital and discharged on their own responsibility. *In this study*; 88 case was >18 years, 89 patients were Females; 95 case were urban residents; 54 cases were married; 84 cases were non-working, Metformin was the most common type of antidiabetic drugs toxicity (73 case).

Conclusions: Anti-diabetic drug toxicity is a critical issue that may be suicidal, accidental.

Keywords: Anti-diabetic drugs, Intoxication, Hypoglycemia, NECTR

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INTRODUCTION

A class of metabolic disorders known as diabetes is typified by elevated blood sugar levels brought on by deficiencies in either insulin production, insulin action, or both (*Balaji et al., 2019*). Since humans first used animal insulin as a treatment for diabetes in 1922, approximately nine major classes of diabetes medications have been developed across the globe. Sulfonylureas, biguanides, insulins, thiazolidinediones (TZDs), meglitinides, dipeptidyl peptidase inhibitors (DPP-IV), alpha-glucosidase inhibitors, glucagon-like peptide agonists (GLP-1), and sodium glucose co-transporter 2 inhibitors (SGLT-2) constitute a number of these drugs. (*Feingold, 2022*).

Because the general population has a high incidence of diabetic illness, insulin and oral hypoglycemic medications are frequently used. On the other hand, they are rarely

involved in overdose occurrences despite their ubiquitous use. Only 6880 of the 2,168,371 individuals exposed to drug poisoning used insulin, while 14,534 used oral hypoglycemic medications, according to the 2015 Annual Report of the American Association of Poison Control Centers (*Manetti et al., 2022*). DM medication toxicity can result from a number of issues, such as accidents and thoughts of committing suicide. Some patients intentionally overdose on their medications. Errors in medication administration can sometimes lead to unintentional insulin toxicity (*Baunmgartner and Devgun 2021*).

THE AIM OF THE WORK

The aim of this study is to identify the incidence of anti diabetic drugs acute toxicity in patients presented to National Environmental and Clinical Toxicology and Research Center, Cairo university, During 2022 (From January to December 2022).

To give an idea about demographic data (age, sex, residence, and marital status), circumstances of toxicity, common clinical presentations, severity of the toxicity, management plan and final outcome.

SUBJECTS AND METHODS

This cross-sectional study was done to evaluate acute toxicity with Anti-diabetic drugs related to patient demographics (age, sex, place of residence, and marital status), toxicological conditions, typical clinical presentations, level of toxicity, treatment strategy, and ultimate results of the treatment implemented in Egypt for patients admitted to the National Environmental and Clinical Toxicology and Research Center (NECTR), Cairo university during the period of the study which is 12 months (from January to December 2022).

The study received approval from the Cairo University Faculty of Medicine's ethics committee as well as the forensic and clinical toxicology department's ethical committee (Approval code: MS-233-2022).

Subjects:

This was conducted on 100 participants who were admitted to poisoning center with history of acute drug intoxication from anti-diabetic medications during the research period.

Inclusion criteria

- Confirmed acute toxicity cases with anti-diabetic drugs presented to NECTR by full detailed history and available drugs level measuring labs.
- Both sexes
- Two groups of age: (first: below 18 years old and second: above 18 years old)
- Diabetic or non-diabetic.

Exclusion criteria

Co ingestion of another drugs.

Methods:

A cross sectional research. Data of all anti-diabetic drugs acute toxicity cases who are presented to (NECTR) during research period, were collected and analyzed after obtaining approval from the ethical committee.

Cases were evaluated as follows:

- Demographics: age, place of living, sex, occupational status and marital status.
 - Toxicity history: intake route, mode - place of administration, delay period till patient

reach to (NECTR), circumstances of toxicity (accidental or suicidal), the method of getting the drug, and history of chronic use of this drug or preexist disease.

- Family history of diabetes.
- Type of drug: insulin injection, oral hypoglycemic agents or oral anti-hyperglycemic agents.
- Past medical history of patients including history of other medications.
- Clinical presentation
 - Central nervous system manifestations: drowsiness, confusion, headache and coma.
 - Cardiovascular manifestations: tachycardia and hypotension.
 - Respiratory manifestations: dyspnea and apnea.
 - Gastrointestinal tract (GIT) manifestations: vomiting, diarrhea and abdominal pain.
- Physical examination findings
- Investigations done to the patients like Urine analysis, blood glucose level, liver and kidney function tests, arterial blood gas analysis (ABG), complete blood count (CBC).
- Lines of treatment: first aid, GIT (Gastro Intestinal Tract) decontamination, symptomatic treatment and specific treatment (antidotes).
- Admission: whether the patients needed intensive care unit admission, ward admission, observed few hours or no admission required.
- Outcome: enhanced and released, released under personal accountability, or passed away.
- The severity of the poison was assessed by using the Poison Severity Scoring system (PSS) (Persson *et al*, 1998), (Table 1).

STATISTICAL ANALYSIS

The statistical software for the social sciences (SPSS) version 28 (IBM Corp., Armonk, NY, USA) was used to code and enter the data. Frequency (count) and relative frequency (percentage) were used to summarize the data. to compare data that is categorical. The test of chi square (χ^2) was run. When the anticipated frequency is less than five, an exact test was utilized instead (Chan, 2003). The threshold of 0.05 for a P-value was deemed statistically significant.

Table (1): Poisoning Scoring System (PSS) according to sign and symptoms.

Severity Category and Code			
Organ system	Fatal high severity Grade 4 grade 3 Death sever or life threatening (sever)	Moderate severity Grade 2 Pronounced or prolonged sign or symptoms	Low severity Grade 1 Mild, transient, and spontaneously resolving symptoms (mild)
Cardiovascular system	Bradycardia/heart rate<40 for adults, <60 for infants and children Tachycardia HR>180 for adults,>190 infants/ children, >200 in neonates Cardiac arrest	Bradycardia/HR 40-60 for adults, 60-80 for infants/children, 80-90 in neonates Tachycardia HR 140-180 for adults,160-190 infants/ children, 160-200 in neonates Chest pain hypertension, tachypnea Conductance disturbance Hypertension Hypotension	
Respiratory system	Cyanosis .respiratory depression Pulmonary edema Respiratory arrest	Abnormal pulmonary X-ray Pleuritic chest pain/pain on deep breathing Respiratory depression Wheezing Dyspnea, shortness of breath	Cough Upper respiratory pain, irritation Dyspnea, shortness of breath
Nervous system	Coma Paralysis, generalized seizure	Confusion Hallucination Miosis with blurred vision Seizure Ataxia Slurred speech Syncope Peripheral neuropathy	Hyperactivity, headache Profuse sweating, dizziness, Ataxia Peripheral neuropathy
Gastrointestinal system	Massive hemorrhage/perforation of gut	Diarrhea Melena Vomiting	Abdominal pain, cramping Anorexia Constipation Nausea Diarrhea Vomiting
Metabolism	Acid base disturbance (pH <7.15 or >7.7)	Acid base disturbance (pH =7.15 - 7.24 or 7.60-7.69) Elevated anion gap	Fever
Renal system	Anuria renal Failure	Hematuria Oliguria Proteinuria	Polyuria
Muscular system	Muscle rigidity+ elevated creatinine	Fasciculations Muscle weakness Muscle rigidity	Muscle weakness Muscle pain
Local effects on skin	Burns second degree (involving >50% of body surface area) Burns, third degree (involving >20% of body surface area)	Bullae Burns second degree (involving <50% of body surface area), burns, third degree (involving <2% of body surface area)	Skin edema/ Swelling, Erythema, rash, irritation/pain, pruritus Hives/ urticaria
Local effects on eye	Corneal ulcer/ perforation	Corneal abrasion Ocular burn	Lacrimation Mydriasis Miosis Ocular pain/irritation/inflammation (diagnosis of conjunctivitis)
Other effects			Fatigue Malaise

RESULTS

This cross-sectional study was done to evaluate acute toxicity with Anti-diabetic drugs among 100 cases who were admitted at (NECTR), Cairo University during 2022 (from January to December 2022).

Regarding demographic character it was found that most of cases 88 case were > 18 years and 89 case were females, 95 cases live in urban areas, 54 married, 52 qualified educational level and 84 don't have job (**Table 2**).

Regarding most type of antidiabetic drug used, it was found that there were 73 cases used Biguanides (metformin), 11 used insulin and 8 used Sulfonylureas (**Table 3**).

On toxicity history, 61 cases took prescribed drug, 89 cases took it by oral route, 99 cases took the drug in a trial to commit suicide and most of cases (81 cases) had delay time 2-6 hours before seeking medical care. Among the studied cases there were 8 cases with history of Diabetes mellitus (**Table 4**).

Presented symptoms, Among the studied cases there were 2 cases with moist skin, 91 case with upset GIT (nausea-abdominal pain-diarrhea), 2 cases with tachypnea and 7 cases with Drowsy CNS so, the cases that presented with GIT upset is higher than other Symptoms (**Table 5**).

Lab. investigations of studied cases, according to ABG there were 51 case normal, 48 case with metabolic acidosis and 1 case with respiratory alkalosis, according to K there were 98 case normal and 2 cases with hypokalemia, according to Na there were 99 cases normal and 1 case with hypernatremia and according to random blood sugar (RBS) there were 15 case normal and 85 cases with hypoglycemia so, most of cases had normal ABG followed by metabolic acidosis then by respiratory alkalosis and most of cases presented with hypoglycemia followed by normal RBS (**Table 6**).

Regarding hospitalization among the studied cases there was only 1 case who needed oxygen, only 1 case who needed nebulizer, 72 case who had adequate hydration, 94 case who had antiemetics 48 case who had NaHco₃, 86 case who had IV Glucose, 89

case who had GIT decontamination 87 case with activated charcoal and 2 with gastric lavage so, most of the presented cases needed antiemetics, sodium biocarb, glucose and activated charcoal (**Table 7**).

According to duration of hospital stay 12 cases stayed less than 24 hours and 88 cases stayed from 24 to 72 hours so, cases that spent 24 to 72 hours in the hospital is higher than those who spent less than 24 hours. According to duration of outcome there were 6 cases that improved and discharged and 94 cases that Discharge on their own responsibility after initial improvement (**Table 7**).

Relation between antidiabetic drugs toxicity and outcome, There was statistically significance relation (p value=0.005) between biguanids and outcome; in which 1.4% of cases with biguanides toxicity versus 18.5% of other antidiabetic drugs toxicity improved and discharge.

And statistically significance relation (p value>0.001) between combined metformin and DDP4 inhibitors and outcome; all cases with combined toxicity improved and discharged versus only 3.1% of cases with other antidiabetic drugs toxicity, while 96.9% of cases with other antidiabetic drugs toxicity discharged on their own responsibility (**Table 8**).

Table (9) shows relation between insulin toxicity and symptoms, There was statistically significant relation (p value=0.011) between insulin toxicity and moist skin; where 18.2% of cases with insulin toxicity had moist skin versus 0% of other antidiabetic drugs which didn't present with moist skin "all with normal skin".

Also statistically significant relation (p value=0.028) between insulin toxicity and drowsiness; where 27.3% of cases with insulin toxicity versus only 4.5% of cases with other antidiabetic drugs toxicity presented by drowsiness.

Another statistically significant relation between insulin toxicity and respiratory alkalosis (p value=0.012); no case of insulin toxicity presented with respiratory alkalosis.

Table (2): Distribution of the studied cases according to demographic characteristics.

		Count of cases
Age	Less than 18 yrs	12
	More than 18yrs	88
Sex	Male	11
	Female	89
Residence	Urban	95
	Rural	5
Marital status	Married	54
	Single	46
Education level	Qualified	52
	Illiterate	12
	Student	36
Occupation	Physical work	4
	Mental work	12
	No job	84

Table (3): Distribution of the studied cases according to type of antidiabetic drug.

		Count of cases
Type of antidiabetic drugs	Biguanides (metformin)	73
	Insulin	11
	Sulfonylureas	8
	Combined metformin and DDP 4 inhibitors	3
	Glucagon like peptide 1 receptor agonist	2
	Sodium -glucose co transporter 2 inhibitors	2
	Meglitinides	1

Table (4): Distribution of the studied cases according to toxicity history with antidiabetic drug.

		Count of cases
Drug Prescribed by doctor	Yes	61
	No	39
Route of intake	Oral	89
	Injection	11
Manner of toxicity	Accidental	1
	Suicidal	99
Delay time before being transferred to hospital	<2 hrs.	10
	2 to 6hrs.	81
	>6 hrs.	9
History of Diabetes mellitus	Yes	8
	No	92

Table (5): Distribution of the studied cases according to presented symptoms.

		Count of cases
Eye	Normal	100
Skin	Normal	98
	Moist	2
Temperature	Normal	100
GIT	GIT upset	91
	Normal	9
O2 saturation	100 – 90	100
Respiratory Rate	Normal	98
	Tachypnea	2
Auscultation of chest	Normal vesicular breathing	100
Pulse	normal	100
Blood Pressure	normal	100
CNS	Conscious	93
	Drowsy	7

Table (6): Distribution of the studied cases according to laboratory investigations.

		Count of cases
ABG Arterial Blood Gases	Normal	51
	Metabolic acidosis	48
	Respiratory alkalosis	1
Random Blood Sugar	Normal	15
	Hypoglycemia	85
Na (sodium) level	Normal	99
	Hypertremia	1
K (potassium) level	Normal	98
	Hypokalemia	2
HB A1C	Not done	100

Table (7): Distribution of the studied cases according to management in hospital and duration of admission.

		Count of cases
Giving Oxygen to patient	Yes	1
	No	99
Put on Nebulizer	Yes	1
	No	99
Intubation and mechanical ventilation	No	100
Adequate hydration by fluids	Yes	72
	No	28
IV inotropics	No	100
Giving Proton Pump Inhibitor	Yes	100
Giving Antiemetics	Yes	94
	No	6
Giving NaHco3	Yes	48
	No	52
Giving IV Glucose	Yes	86
	No	14
GIT decontamination	Not done	11
	Activated charcoal	87
	Gastric lavage	2
Giving Antidote	No	100
Duration of hospital admission	Less than 24 hours	12
	24- 72 hours	88

Table (8): Relation between antidiabetic drugs toxicity and outcome.

		Biguanides (metformin)				P value	Sulfonylureas				P value
		Yes		No			Yes		No		
		Count	%	Count	%		Count	%	Count	%	
Outcome	Improved and discharge	1	1.4%	5	18.5%	* 0.005	2	25.0%	4	4.3%	0.072
	Discharge on owns' responsibility	72	98.6%	22	81.5%		6	75.0%	88	95.7%	
		Insulin				P value	Meglitinides				P value
		Yes		No			Yes		No		
		Count	%	Count	%		Count	%	Count	%	
Outcome	Improved and discharge	0	0.0%	6	6.7%	1	0	0.0%	6	6.1%	1
	Discharge on owns' responsibility	11	100.0%	83	93.3%		1	100.0%	93	93.9%	
		Sodium -glucose co transporter 2 inhibitors				P value	Glucagon like peptide 1 receptor agonist				P value
		Yes		No			Yes		No		
		Count	%	Count	%		Count	%	Count	%	
Outcome	Improved and discharge	0	0.0%	6	6.1%	1	0	0.0%	6	6.1%	1
	Discharge on owns' responsibility	2	100.0%	92	93.9%		2	100.0%	92	93.9%	
		Combined metformin and DDP 4 inhibitors				P value					P value
		Yes		No							
		Count	%	Count	%		Count	%	Count	%	
Outcome	Improved and discharge	3			100.0%	3			3.1%		* <0.001
	Discharge on owns' responsibility	0			0.0%	94			96.9%		

*P value <0.05 is significant

Table (9): Relation between insulin toxicity and presented manifestations.

Presented manifestations		Insulin Toxicity				P value
		Yes		No		
		Count	%	Count	%	
Skin	Moist	2	18.2%	0	0.0%	* 0.011
	Normal	9	81.8%	89	100.0%	
GIT	GIT upset	8	72.7%	83	93.3%	0.058
	Normal	3	27.3%	6	6.7%	
RR	Tachypnea	0	0.0%	2	2.2%	1
	Normal	11	100.0%	87	97.8%	
CNS	Drowsy	3	27.3%	4	4.5%	* 0.028
	Conscious	8	72.7%	85	95.5%	
ABG	Respiratory alkalosis	0	0.0%	1	1.1%	* 0.012
	Metabolic acidosis	1	9.1%	47	52.8%	
	Normal	10	90.9%	41	46.1%	
RBS	Hypoglycemia	10	90.9%	75	84.3%	1
	Normal	1	9.1%	14	15.7%	
Na	Hypernatremia	0	0.0%	1	1.1%	1
	Normal	11	100.0%	88	98.9%	
K	Hypokalemia	0	0.0%	2	2.2%	1
	Normal	11	100.0%	87	97.8%	

*P value <0.05 is significant.

DISCUSSION

Toxicity from anti diabetic drugs may be accidental, suicidal. Some patients deliberately overdose on medications, therapeutic misadventures and medication administration errors cause unintentional poisoning. The study included 100 cases aimed at evaluating acute toxicity with Anti-diabetic drugs regarding demographics (age, living area, sex, and marital status), circumstances of toxicity, frequent clinical manifestations, the degree of toxicity, the treatment strategy, and the ultimate result of the management.

In the present study, according to age it was found that acute toxicity cases were 12 cases <18 years and 88 cases >18 years.

Manetti et al., (2022) showed that among suicide cases, age group >50-year-old was presenting (48.2%) due to difficult identification of the rest of cases.

According to sex it was found that there were 11 male case and 89 females. Our findings agree with *Tawfik and Khalifa, (2017)* that showed the female is higher percentage than male.

This could be explained as females are more vulnerable to psychological and emotional stresses. Also agree with *Abdelhamid, (2021)* that showed 54.8% and 45.2% of poisoned cases were females and males respectively.

This came in contrast to *Nazari et al., (2020)* who showed that there was no difference between male and female patients undergoing insulin and oral diabetic drugs suicidal toxicity.

According to residence it was found that there were 95 cases were urban residents and 5 cases were rural residents. This is in harmony with *Islambulchilar et al., (2009)* revealed that 81% of the instances were in urban areas. This finding may be a reflection of the rising economic and psychological stress or pressures brought on by living in tough conditions, issues related to immigration from rural areas, and urban unemployment.

This is in contrast to *Kasemy et al., (2021)* who showed that rural residency served as a significant predictor to committing suicide suggesting that the difference may be explained by the differences in age,

educational level, occupation and geographical differences.

According to marital status it was found that there were 54 cases were married and 46 cases were single. Our findings are in harmony with *Nazari et al., (2020)* that indicated a majority of admissions are married and this is explained by the depression in married individuals.

According to education level it was found that there were 52 cases were qualified, 12 cases were illiterate and 36 cases were students. And according to occupation it was found that there were 4 cases physical occupants, 12 cases mental occupants and 84 cases not working.

Kasemy et al., (2021) showed that patients who were not working showed a significantly high percentage of suicide by self-poisoning and this explained by unemployment and economical stress is a cause of suicide however, this study disagrees with our study in education level as it showed a significantly high percentage of students.

El-Mahdy et al., (2010) showed that 35.9% of patients were unmarried bachelors, 32.2% were students, 23% were working, and 9% were housewives.

According to type of antidiabetic drugs it was found that there were 73 case used Biguanides (metformin), 11 case used insulin, 8 cases used Sulfonylureas, 3 cases used combined metformin and DDP 4 inhibitors, 1 case utilized meglitinides, 2 cases used sodium-glucose cotransporter 2 inhibitors, and 2 cases used agonists of the glucagon-like peptide 1 receptor. This is explained by metformin is a widely used biguanide drug due to its safety, low cost, its benefits for various diseases and that it is taken by oral route (*Bailey, 2017*).

In contrast to our work, *Von Mach et al., (2004)* who showed that in the majority of cases of antidiabetic agent overdose, sulfonylureas were the prescribed prescription.

According to route of intake it was found that its taken by oral rout in 89 case and by injection in 11 cases. This was (Our findings) agreement with *Tawfik and Khalifa (2017)* and *Nazari et al., (2020)* study revealed that, in comparison to other intake methods, oral

exposure accounted for a greater proportion of instances.

According to manner of toxicity it was found that there were 99 suicidal cases and 1 accidental case. Our findings are in harmony with *Nazari et al., (2020)* and *Sorodoc et al., (2011)* that indicated a majority of admissions were suicidal cases.

According to delay period 10 cases delayed less than 2 hours, 81 cases delayed 2 to 6 hours and 9 cases delayed more than 6 hours. A delay of more than six hours was proposed to be caused by mild poisonings, which are frequently treated at home initially.

Among the studied cases there were 8 cases with history of Diabetes mellitus and 92 cases with no history of Diabetes mellitus. This is contrast to *Manetti et al., (2022)* who revealed that out of 109 occurrences of insulin or hypoglycemic medication overdose, at least 58 cases involved individuals with diabetes mellitus (53.2%).

According to ABG finding there were 51 cases normal, 48 cases with metabolic acidosis and 1 case with respiratory alkalosis. Furthermore *DeFronzo et al. (2016)* discovered that metformin and other medications in the biguanide class raise plasma lactate levels in a plasma concentration (metabolic acidosis) by primarily inhibiting mitochondrial respiration in the liver.

Also *Von Mach et al. (2006)* showed that metformin-associated lactic acidosis is a critical of serious suicidal ingestion of metformin.

According to random blood sugar (RBS) there were 15 cases normal and 85 cases with hypoglycemia. This is in harmony with *Manetti et al., (2022)* who shown that most of cases got hypoglycemia from hypoglycemic medication poisoning.

According to poison severity score (PSS) there were 8 cases with no PSS score and 92 case with mild score. Also *Abdelhamid, (2021)* showed that mild cases poisoning accounting for the majority (79.4%), moderate instances for 14.4%, and severe cases for 6.2%.

According to duration of hospital stay 12 cases stayed less than 24 hours and 88 cases stayed 24 to 72 hours and according to

outcome there were 6 cases that improved and discharged and 94 cases that discharge on their own responsibility.

This is contrast to *El-Mahdy et al., (2010)* who demonstrated that the length of hospital stay varied, with a mean of 28.3 hours and a range of 1 hour up 168 hours (7 days). The lowest time frame was associated with mild instances or patients with social issues who requested to leave the hospital. The lengthiest period was correlated with the severity of the illness, and 43.8% of poisoned patients recovered after being admitted to the hospital and given the proper medical attention

Also *Chan et al., (1994)* showed that 30.5% of patients discharged themselves prematurely from hospital after admission.

Among the studied cases there was only 1 case who needed oxygen, only 1 case who needed nebulizer, 94 cases had antiemetics, 48 cases had NaHco₃, 86 cases had IV glucose, 89 cases had GIT decontamination 87 with activated charcoal and 2

with gastric lavage. This goes with *Klein-Schwartz et al., (2016)* who showed that activated charcoal should be given within 2 h of ingestion of immediate release sulfonylureas and give to these patients adequate hydration, antiemetics and NaHco₃.

In this research there was neither statistically significant relation between type of antidiabetic drug and manner of toxicity nor between type of antidiabetic drug and age.

On other hand *Spiller, (1998)* showed statistically significant relation between insulin overdose and manner of toxicity and statistically significant relation between antidiabetic drug and age (commonly in children).

The current study showed no statistically significant relation between manner of toxicity and history of diabetes mellitus.

Ceretta et al., (2012) study showed that a higher prevalence of suicidal ideation in type 2 DM patients and this is explained by presence of mood disorder in diabetic patients.

A statistically significant relationship was found between outcome (improved and discharged) and biguanides (metformin).

This in harmony with *Jagia et al., (2011)* who showed that early diagnosis can result in successful outcome.

The current study showed statistically significant relation between both (combined metformin and DDP 4 inhibitors and outcome (discharged from hospital).

This in harmony with *Bahulikar et al., (2017)* who demonstrated that a 17-year-old girl in good condition who took eight to nine Janumet tablets—a combination of metformin and DDP 4 inhibitors—had hypoglycemia and seizures upon admission. The patient did not wake up for two days. Her clinical condition gradually became better, and she was allowed to leave the hospital.

A statistically significant relation between insulin and moist skin, between insulin and drowsiness and between insulin and respiratory alkalosis was found.

These findings are in harmony with *Johansen et al., (2018)* who showed that symptoms of insulin overdose were cerebral impairment in 73% and symptoms associated with sympathetic nervous system activation in 43% and with *Efrimescu and Doyle, (2013)* who showed that the symptoms and effects of insulin overdose can be grouped in two classes: features secondary to sympathomimetic effect (sweating and hyperventilation), neuroglycopenic effect (abnormal behavior, altered level of consciousness, drowsiness) and electrolytes disturbances.

CONCLUSION

Anti-diabetic drug toxicity is a critical issue that may be suicidal, accidental or homicidal. In this study; 88 cases were >18 years, 89 of the patients were Females; 95 cases were urban residents; 54 cases were married; 84 cases were non-working, Metformin was the most common type of antidiabetic drugs toxicity (73 case).

The oral route followed by injection was the most common routes of toxicity in 89 and 11 cases, respectively. 99 cases were suicidal attempts, prescribed drugs were more common than the none prescribed, and most of cases were not have a history of diabetes mellitus.

RECOMMENDATION

- Referral of the patients with suicidal intoxication to psychiatric consultation for assessment and follow up to avoid recurrent suicidal attempts.
- Additional larger cohort studies and multi center studies are needed.
- Plethora of studies to compare between different anti diabetic drugs and their adverse effects.

Declaration of interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Ethics approval and consent to participants: The study received approval from the Cairo University Faculty of Medicine's ethics committee as well as the forensic and clinical toxicology department's ethical committee.

Availability of data and material: All data are available on demand.

Author contribution: all authors contributed to the study conception and design, material preparation, data collection and analysis were performed by Marwa Issak Mohamed' Amal Salama Mahmoud Mahmoud' Sara Mahmoud Emam Mohamed, Nermin Hamdy Mohamed, Walaa Abdel-hady Abdel-halim and all authors commented on previous versions of the manuscript.

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دراسة مقطعية مستعرضة لحالات التسمم الحاد بأدوية علاج مرض السكر بمركز السموم خلال عام ٢٠٢٢

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الملخص العربي

المقدمة: قد يحدث التسمم الناتج عن الأدوية المضادة لمرض السكري لأسباب عديدة عرضية وانتحارية. بعض المرضى يتعمدون تناول جرعة زائدة من الأدوية. وفي حالات أخرى، تتسبب الأخطاء العلاجية والأخطاء في تناول الدواء في حدوث تسمم غير مقصود.

هدف الدراسة: الهدف من هذه الدراسة هو تحديد مدى حدوث التسمم الحاد للأدوية المضادة لمرض السكر لدى المرضى الذين تم تقديمهم إلى المركز القومي للسموم الاكلينيكية و البيئية بجامعة القاهرة خلال عام ٢٠٢٢ (من يناير إلى ديسمبر ٢٠٢٢). لإعطاء فكرة عن البيانات الديموغرافية (العمر والجنس والإقامة والحالة الاجتماعية)، ظروف السمية، الاعراض السريرية الشائعة، شدة السمية، الفحوصات، العلاج والنتيجة النهائية.

المرضى وطرق البحث: شملت الدراسة ١٠٠ حالة تم قبولها في المركز القومي للسموم الاكلينيكية و البيئية بجامعة القاهرة خلال عام ٢٠٢٢. وتم تحليل الحالات فيما يتعلق بالبيانات الديموغرافية وظروف السمية والعروض السريرية الشائعة وشدة السمية وخطة العلاج والنتيجة النهائية.

النتائج: من نتائج الدراسة اتضح أن أكثر أنواع الأدوية المضادة لمرض السكر سمية شيوعاً هي البيجونايدات والأنسولين. معظم الحالات لم تكن مصابة بالسكري، وكانت محاولات انتحارية، وبقيت من ٢٤ إلى ٧٢ ساعة في المستشفى وخرجت على مسؤوليتها الخاصة. في هذه الدراسة ٨٨ حالة كانت أكبر من ١٨ عامًا، ٨٩ مريضاً كانوا من الإناث؛ ٩٥ حالة كانت من سكان الحضر؛ ٥٤ حالة متزوجة؛ ٨٤ حالة كانت غير عاملة، وكان الميتفورمين هو النوع الأكثر شيوعاً من الأدوية المضادة لمرض السكر (٧٣ حالة).

الخلاصة: نستنتج انه تعتبر سمية الأدوية المضادة لمرض السكري مشكلة حرجة قد تكون انتحارية أو عرضية.