

Pattern of deliberate self-poisoning cases admitted to Poison Control Center Ain Shams University Hospitals during the years 2015-2016

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Abstract

Suicide is one of the leading causes of death worldwide. Deliberate self-poisoning (DSP), is the most common method of attempted suicide and accounts for the majority of suicide-related hospital admissions. The incidence in Egypt tends to be under-estimated.

Aim: Evaluating the pattern of deliberate self-poisoning cases who were admitted to Poison Control Center Ain Shams University Hospitals (PCC-ASUH) from January 2015 to December 2016.

Method: An observational study was conducted including all patients deliberately self-poisoned throughout the study period. Recorded data in the present study included: age, gender, and residence, type of causative agent, severity of poisoning, and mortality.

Results: A total of 10035 and 10758 self-poisoned patients were received in 2015 and 2016 respectively. Results remained similar in both years of the study. Cases were predominantly in the age group between 19 and 30 years, females 69% and were received from Cairo. Used substances were mainly drugs: centrally-acting drugs ranked first including Tricyclic antidepressants TCA, Benzodiazepines (BZD), antipsychotics and carbamazepine followed by analgesics and cardiopulmonary drugs. Among non-drug agents, organophosphorus insecticides were the most common. Lower number of cases used phosphides, corrosives and detergents, petroleum distillates, phenol and paraphenylenediamine (PPD). The majority of cases were mild (>70%) in both years of the study. Severe cases constituted 6.8% of DSP cases, with overall in-hospital mortality 0.6%. Organophosphorus insecticides topped the agents responsible for mortality followed by unknown drugs with small contributions by other drug and non-drug agents.

Conclusion: Deliberate self-poisoning is a common presentation to PCC-ASUH. General trends show significant predominance of adolescents and young adults especially females, usage of drugs mainly centrally-acting agents, and low case fatality which is mainly in relation to organophosphorus compounds.

Introduction

Suicide is a global problem especially in low- and middle-income countries (World Health Organization, 2014_a). Deliberate self-poisoning (DSP), the third leading method of suicide overall, accounts for more than 70% of all serious suicide attempts. As the most common method of attempted suicide, DSP accounts for 85% to 95% of suicide-related hospital admissions. Non-fatal self-poisoning causes hundreds of thousands of emergency room and hospital visits each year and generates substantial costs to the health care system (Albert et al., 2015; Finkelstein et al, 2015).

In 2014, the World Health Organization listed Egypt as among the countries with the lowest suicide

rate, at less than five suicides per 100,000 people (World Health Organization, 2014_a). Incidence of suicide tends to be under-estimated as suggested by a number of studies. El Mahdy et al., (2010) provided an overview about the incidence of suicidal attempts among teenagers attending the National Egyptian Centre of Environmental and Toxicological Research (NECTR) with a report of 2350 suicidal attempts during a 6 months period. The problem of inadequate surveillance and misclassification was also suggested by Mahmoud et al., (2016) in evaluation of suicidal deaths in Mansoura city from 2009-2014 and reported pesticides and drug overdoses as leading methods regardless of age. Hence, this study aimed at evaluation of deliberate self-poisoning cases

admitted to Poison Control Center Ain Shams University Hospitals (PCC –ASUH) as the largest tertiary care center in Egypt specialized in management of poisonings from January 2015 to December 2016 as an up-to-date assessment of the demographics, patient characteristics and substances involved in deliberate self-poisoning.

Subject and Method

This work was conducted as an observational study including all patients deliberately self-poisoned who were admitted to Poison Control Center Ain Shams University Hospitals PCC -ASUH from January 2015 to December 2016. Data were collected after approval of the Research Ethics Committee of Faculty of Medicine Ain Shams University. Also an approval was obtained from the general director of the PCC -ASUH .All data were stored anonymously and confidentiality issues were considered. The collected data was used only for the purpose of the study.

Recorded data in the present study included: age, gender, and residence, type of agent, severity, and mortality. Data collected throughout the study period were tabulated and statistically analyzed using standard SPSS (Standard Package for Social Science) software package, version 20 (Chicago. IL).

Results

A total of 10035 and 10758 self-poisoned patients were received in 2015 and 2016 respectively. Cases were not evenly distributed across age groups, though remained almost consistent for the entire study period. Almost half of the total number of cases belonged to the age group between 19 and 30 years followed by 12 to 18 years. Incidence declined with increasing age though was still significant above 50 years of age. Female gender constituted about 69% of cases in both years of the study. According to residence, cases were mainly received from Cairo followed by Kalioubeya and Giza during both years of the study, while a minority of about 5% of cases lived in more distant governorates. The distribution of

age, gender and residence are illustrated in table 1, 2 and 3.

Among the toxic agents used for deliberate self-poisoning, drugs were used in 2/3 of cases, with no marked variation in both years of the study (Table 4). When analyzed by the type of used drugs, centrally-acting drugs ranked first with statistically insignificant difference between 2015 and 2016 (17% and 17.9 % respectively). Among centrally-acting drugs, TCA were used by 5.261% of cases in 2015 and 6.571% of cases in 2016. The use of analgesics in DSP was statistically different in both years of the study (12.1% of cases in 2015 and 11.6% of cases in 2016). Analgesics included mainly NSAIDs and paracetamol/paracetamol containing cold preparations. Cardiopulmonary drugs constituted about 9% of causative agents employed in DSP with statistically insignificant difference in both years of the study. Regarding types of cardiovascular drugs, theophylline accounting for 6% of cases in 2015 and 5.3% in 2016 followed by β -blockers and antihypertensive drugs (Table 5).

Regarding non-drug agents, organophosphorus insecticides were the most common accounting for 13.9% and 14.2% in 2015 and 2016 in comparison to much lower number of cases by phosphides, corrosives and detergents, petroleum distillates, phenol and PPD (Table 6).

According to severity of poisoning, the majority of cases were mild (>70%) in both years of the study (Table 7). Severe cases constituted were 6.8% of DSP cases, with overall in-hospital mortality 0.6% in both years of the study .Organophosphorus insecticides topped the agents responsible for mortality followed by unknown drugs with small contributions by other drug and non-drug agents. In-hospital mortality and offended agents are illustrated in table (8).

Table (1): Percentage of age distribution of deliberate self-poisoning cases admitted to PCC -ASUH during years 2015-2016.

Age (years)	2015		2016	
	No	%	No	%
12-18	2800	27.9	3106	28.8
19-30	4915	48.9	5178	48.1
31-40	1335	13.3	1447	13.4
41-50	555	5.5	565	5.3
>50	430	4.3	462	4.3
Total	10035		10758	

Table (2): Percentage of sex distribution of deliberate self-poisoning cases admitted to PCC -ASUH during years 2015-2016.

Sex	2015		2016	
	No	%	No	%
Female	6921	68.96	7453	69.27
Male	3114	31.03	3305	30.72
Total	10035		10758	

Table (3): Percentage of residence of deliberate self-poisoning cases admitted to PCC -ASUH during 2015-2016.

Region	Governorates	2015			2016		
		No	%	%	No	%	%
Great Cairo	Cairo	6828	68.04	94.14	7436	69.1	95.47
	Kalioubeya	1646	15.9		1820	16.91	
	Giza	1026	10.20		1018	9.46	
Others	Upper Egypt Governorates	248	2.39	5.149	210	1.95	5.514
	Other Delta Governorates	154	1.44		138	1.28	
	Suez Canal Governorates	119	1.18		128	1.12	
	Sinai	14	0.139		8	0.164	
Total		10035			10758		

Table (4): Percentage of type of causative agent in self-poisoning cases admitted to PCC-ASUH during 2015-2016.

Type	2015		2016	
	No	%	No	%
Drug	7509	74.82	7947	73.87
Non-drug	2526	25.17	2811	26.12
Total	10035		10758	

Table (5): Drugs involved in deliberate self-poisoning cases admitted to PCC -ASUH during years 2015-2016.

Drugs		2015		2016	
		No	%	No	%
Centrally acting drugs	TCA	528	5.261	707	6.571
	BZD	398	3.966	268	2.491
	Psychotropic drugs	355	3.537	454	4.455
	Carbamazepine	201	2.002	225	2.091
	Tramadol	140	1.395	172	1.598
	Other antiepileptic	42	0.418	36	0.334
	SSRI	28	0.279	31	0.288
	Lithium	8	0.079	10	0.0929
	Anticholinergic	8	0.079	23	0.213
	Total	1708	17.02	1926	17.902
Analgesics	NSAIDs	675	6.726	655	6.0
	Paracetamol +cold preparations	448	4.464	477	4.433
	Salicylate	93	0.926	125	1.161
	Total	1216	12.116	1257	11.684
Cardio-pulmonary drugs	Theophylline	608	6.058	571	5.3
	Beta blockers	244	2.40	281	2.6
	Antihypertensive	112	1.11	154	1.43
	Digoxin	19	0.189	23	0.213
	CCB	2	0.0199	5	0.0464
	Total	985	9.815	1034	9.611
Miscellaneous	Unknown	1863	18.565	1727	16.053
	Antibiotics	762	7.599	832	8.290
	Antihistamines	225	2.20	171	1.589
	Anti-diabetic medication	354	3.521	398	3.78
	Vitamins	125	1.245	165	1.533
	Metronidazole	142	1.415	195	1.812
	Miscellaneous	79	0.787	173	1.608
	OCP	50	0.588	69	0.641
Total	3600	35.87	3724	34.61	
Total	10035		10758		

TCA=tricyclic antidepressants, BZD= benzodiazepines, SSRI=selective serotonin reuptake inhibitors, NSAIDs=non-steroidal anti-inflammatory drugs, BB= β -blockers, CCB=calcium channel blockers, OCP= oral contraceptive pills

Table (6): Non-drug agents involved in self-poisoning cases admitted to PCC-ASUH during 2015-2016.

Type		2015		2016	
		No	%	No	%
Insecticides & Rodenticides	Organophosphate insecticides	1396	13.911	1531	14.23
	Zinc & aluminum phosphide	447	4.454	460	4.275
Detergents	Corrosives	370	3.687	475	3.950
	Detergents	179	1.783	199	1.849
	Kerosene & petroleum distillates	91	0.906	103	0.957
	Phenol	32	0.318	30	0.278
	PPD	11	0.109	13	0.120
Total		2526		2811	

PPD= paraphenylene diamine

Table (7): Poisoning severity for grading deliberate self-poisoning cases admitted to PCC -ASUH during years 2015-2016.

Degree of severity	2015		2016	
	No	%	No	%
Mild	7195	71.699	8003	74.391
Moderate	2154	21.464	2019	18.767
Severe	686	6.836	736	6.841
Total	10035		10758	

Table (8): Mortality-related offending agents in deliberate self-poisoning cases admitted to PCC -ASUH during years 2015-2016.

Agent	2015		2016	
	Number	%	Number	%
OP	20	33.3	27	45
Unknown	13	21.6	6	10
CBZ	4	6.66	2	3.33
Corrosives	4	6.66	2	3.33
Phosphide	3	5	9	15
BZD	3	5	0	0
Cerebral hemorrhage	3	5	0	0
TCA	2	3.33	4	6.66
OHG	2	3.33	0	0
Lithium	2	3.33	2	3.33
Tramadol	1	1.6	1	1.6
Neuroleptics	1	1.6	2	3.33
BB	1	1.6	2	3.33
Antihistamines	1	1.6	0	0
Theophylline	0	0	1	1.6
PPD	0	0	1	1.6
Kerosene	0	0	1	1.6
Total mortality	60		60	

OP: organophosphorus insecticides, BZD: benzodiazepines, TCA: tricyclic antidepressants
OHG: oral hypoglycemic drugs, BB: β blockers, PPD= paraphenylene diamine

Discussion

Deliberate self-poisoning is a common presentation to PCC-ASUH considering the high number of cases received every year. The current study provides an important overview of DSP annual trends especially

with the limited number of studies on DSP in Egypt and the possible underreported incidence due to cultural and social factors.

Age distribution among cases of deliberate self-poisoning was similar during years 2015 and 2016. The peak age group for both genders was 19 to 30 years followed by 12 to 18 years. The current study demonstrates that deliberate self-poisoning is a predominant problem in adolescents and young adults. Increased risk of suicidal ideation and behavior was attributed to a wide range of biological, social and environmental factors; including cognitive immaturity, age-related amplified impulsivity, stressful life events, pubertal onset of depression, low parental monitoring, and risk behavior such as substance abuse (King et al, 2001; Dervic et al., 2008; Hills et al., 2009)

Despite a declining percentage of DSP presentations with age, a notable number of cases occurred over the age of 50. Older adults generally report fewer self-harming behavior despite higher completed suicide rates. Increased mental fragility, psychiatric and medical morbidities in addition to access to multiple prescription medications can be considered as potential vulnerabilities of old age (Gavrielatos et al, 2006; Van Orden & Conwell, 2015; Segal et al, 2016).

Predominance of females among cases of deliberate self-poisoning was found in the present study during both years of the study. Similarly, previous studies demonstrated gender differences in suicide-related behaviors and showed that females are more likely to attempt suicide by poisoning compared to males who are more likely to use higher violence and lethality methods (Callanan & Davis, 2012; Karch et al, 2012). However, different trends with male predominance were noted in Asia (Raesha et al, 2009; Nguyen et al, 2010; Rajapakse et al, 2013).

Although ASU-PCC receives cases from all governorates as the largest tertiary care center in Egypt for management of poisonings, the majority of cases in the current study were residents of Cairo and nearby governorates. This may reflect an increased rate of suicide in more urbanized areas in comparison to rural areas. Urban-rural differences in suicide rate may relate to the prevalence of psychiatric comorbidities, physical illnesses, and exposure to risk behaviors and psychological stressors accompanying the increased density and diversity of city populations (Qin, 2005). Moreover, as admitted by Khan and Hyder (2006), socio-cultural barriers may limit both seeking medical care and proper reporting of cases from rural areas.

Substances implicated in deliberate self-poisonings were principally drugs during both years 2015 and 2016. Among used drugs, centrally-acting drugs topped the list including TCA, BZD,

antipsychotics and carbamazepine. Interestingly, 90% of suicide completers and attempters meet the criteria for a diagnosable psychiatric illness and psychiatric patients have a greater number of prescribed drugs in comparison to the general population. Thus availability and accessibility, especially through prescription, might be an important motivation to the choice of psychotropic drugs for DSP providing potential explanation to these results (Haw et al, 2001; Tournier et al, 2009; Gjelsvik et al; 2012).

Despite lower number of cases compared to other centrally acting drugs, the use of tramadol in DSP cannot be overlooked especially with the observed increase in 2016 compared to 2015. Data indicates a growing number of tramadol abusers, in some Middle East countries including Egypt leading to up-scheduling in 2009 (World Health Organization, 2014_b). According to Loffredo et al., (2015) tramadol was the most commonly abused pharmaceutical drug among Egyptian youth.

Possible mediators of the association between SUD and suicide were postulated. Factors increasing the chances of acting on suicidal thoughts in cases of SUD may include aggressive-impulsive traits, associated mood disorders, cognitive difficulties leading to a maladaptive way of managing painful feelings and associated neurobiological factors such as abnormal serotonin function (Maser et al., 2002, Pettinati et al., 2002, Harkavy-Friedman et al., 2006; Sublette et al., 2009; Oquendo et al., 2010).

Expert Committee on Drug Dependence, World Health Organization.

Thirty-sixth meeting of the Expert Committee on Drug Dependence- Tramadol Update Review Report Agenda item 6.1.2014. Geneva, Switzerland: World Health Organization; 2014

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Findings in the current study, suggest that analgesics were commonly employed in DSP. The used analgesics were mainly NSAIDs and paracetamol/paracetamol containing cold

preparations. This may be attributed to their availability and the presence of household stocks. Additionally, the status of non-opioid analgesics as non-prescription preparations may imply that it is less likely to be fatal in overdose. This might be an important motivation for choosing them in cases of non-suicidal self-poisoning which can be viewed as a type of self-harm behaviors not associated with intent to die (Heilbron et al., 2010; Zerbo & Kondracke, 2014).

Basic trends of poisoning generally shows a regional variation related to availability and frequency of prescription, it was not surprising in the present study to record cases of DSP with cardiopulmonary drugs including mainly theophylline, B-Blockers and antihypertensive drugs. Equivalently, reports of theophylline poisoning in Egypt are still recorded to date (El Masry & Tawfik, 2013; Hammad et al., 2014; Tawfik & Khalifa, 2017). This is in contrast to the noted marked decrease of documented toxic exposures over the past decade which reflects the diminishing use of theophylline for management of asthma (Mowry et al., 2015).

Possible explanations of the increased availability of antihypertensive agents for overdose include the high incidence of hypertension in adult population in Egypt (26.3 %) and an expanded use of beta-blockers in various disorders beside their traditional use in treating hypertension (WHO & ARE-Ministry of Health & Population, 2012; Mowry et al., 2015).

The current study showed statistically insignificant difference between 2015 and 2016 regarding the percentage of cases using centrally acting and cardiopulmonary drugs. The distribution of drugs used for DSP in our study was comparable to previous reports in France, Belgium, and Germany where psychotropic drugs, especially benzodiazepines and antidepressants, ranked first. On the other hand, paracetamol was the most common substance used in DSP in Turkey, US and UK. (Xiang et al, 2012; Hendrix et al., 2013; Bailey & Wisniacki, 2014; Ekingen et al., 2015; Sorge et al., 2015; Beaune et al., 2016).

Regarding non-drug agents, statistically insignificant difference between 2015 and 2016 was also noted. Organophosphorus insecticides were the most common non-drug agents followed by phosphides, corrosives and detergents. Less number of cases used petroleum distillates, phenol and PPD. Agricultural pesticides is responsible for third of the global burden of suicide (World Health Organization, 2014_a). The widespread use of household chemicals among agents used for DSP is plausible, owing to their availability in the domestic environment,

widespread use, and relatively cheap price (Basher et al., 2015).

Although severe cases constituted 6.8% of cases in both years, almost all DSP patients survived their hospital stay with overall in-hospital mortality 0.6% in both years of the study. This relatively low case fatality for self-poisoning was similarly noted (Heyerdahl et al., 2009; Schwake et al., 2009; Okumura et al., 2012). However, the situation may be different in studies performed in rural Asia. Different characteristics of the ingested agent, demographics and cultural and ethnic backgrounds are among the contributing factors to adverse clinical course and higher incidence of fatality (Eddleston et al., 2005; Shokrzadeh et al., 2017).

Of the total number of cases of DSP during years 2015-2016, mortalities were mainly related to organophosphorus compounds followed by unknown drugs. As organophosphorus poisoning is one of the most common causes of worldwide poisoning fatalities, these results can be justified. This considerable mortality is mostly attributed to respiratory failure occurring in into two overlapping clinical syndromes: acute cholinergic respiratory failure and intermediate syndrome. Early respiratory failure during the acute cholinergic crisis may involve central respiratory depression, respiratory muscle weakness, and direct pulmonary effects (bronchospasm and bronchorrhoea). On the other hand, delayed failure may be due to respiratory muscle weakness. Cardiovascular effects are also potentially fatal. The possible mechanisms of cardiac toxicity include sympathetic and parasympathetic over-activity, hypoxemia, acidosis, electrolyte derangements and a direct toxic effect on myocardium. Further deaths can be related to prehospital disturbed level of consciousness such as aspiration and anoxic brain damage (Carey et al., 2013; Chowdhary et al., 2014; Laudari et al., 2014; Javed et al., 2016)

Additionally, mortalities related to unknown drugs may reflect the challenging management of poisoning when the characteristics and clinical course of the toxic exposure are unknown. This may be associated with delayed intensive treatments and failure to recognize the potential for serious or delayed toxic effects (Enfield & Kirk, 2014).

Conclusion and recommendation

Low fatality of deliberate self-poisoning raises the possibility to focus on preventive measures. Further studies are needed to identify trends of deliberate self-poisoning national wide and hence implement strategies for clinical prediction, identification of cases at risk and appropriate intervention. Longitudinal surveillance and psychiatric consultation are also strongly suggested to relate the

first episode of DSP to subsequent suicide and premature death and its role as a predictive factor.

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الملخص العربي

نمط حالات التسمم الذاتي المتعمد التي أدخلت بمركز علاج التسمم بمستشفيات جامعة عين شمس خلال عامي ٢٠١٥-٢٠١٦

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يعتبر الانتحار واحداً من الأسباب الرئيسية للوفاة على مستوى العالم كما يعتبر التسمم الذاتي المتعمد الأسلوب الأكثر شيوعاً لمحاولة الانتحار فضلاً عن كونه سبباً لغالبية حالات دخول المستشفى المرتبطة بالانتحار، ويميل تقييم المعدل في مصر إلى القصور.

الهدف من الدراسة: تقييم النمط الخاص بحالات التسمم الذاتي المتعمد الذين تم حجزهم في مركز علاج التسمم بمستشفيات جامعة عين شمس من يناير ٢٠١٥ إلى ديسمبر ٢٠١٦.

المنهج: أجريت دراسة رصدية شملت جميع حالات المرضى الذين تعرضوا للتسمم الذاتي المتعمد طوال فترة الدراسة. واشتملت البيانات المسجلة في هذه الدراسة على: العمر والجنس والإقامة ونوع المسبب وشدة التسمم والوفيات.

النتائج: تم تلقي ما مجموعه ١٠٠٣٥ و ١٠٥٧٨ مريضاً مصاباً بالتسمم الذاتي في عامي ٢٠١٥ و ٢٠١٦ على التوالي حيث ظلت النتائج متماثلة في سنتي الدراسة. وكانت الحالات في أغلبها في الفئة العمرية ما بين ١٩ و ٣٠ عاماً، ومن الإناث ٦٩٪. وواردة من مدينة القاهرة. وكانت المواد المستخدمة من الأدوية بشكل أساسي حيث احتلت الأدوية المؤثرة على الجهاز العصبي المرتبة الأولى وتضم مضادات الإكتئاب ثلاثية الحلقات، والمنومات، مضادات الذهان والكاربامازيبين، تليها المسكنات والأدوية القلبية الرئوية. وكانت المبيدات الحشرية العضوية الفوسفاتية هي الأكثر شيوعاً بين العوامل الغير دوائية، مقارنة بعدد أقل من الحالات المستخدمة للفوسفينات، والمواد الكاوية والمنظفات، ومشتقات النفط، والفينول و بارافينيلين ثنائي الأمين. وبينما كانت معظم الحالات طفيفة (< ٧٠٪) في كل من سنتي الدراسة، شكلت الحالات الشديدة ٦,٨٪ من حالات التسمم الذاتي المتعمد، مع ٠,٦٪ لإجمالي الوفيات أثناء الإقامة بالمستشفى. وقد تصدرت المبيدات الحشرية الفسفورية العضوية العوامل المسؤولة عن الوفيات، وتلاها العقاقير الغير معروفة مع نسب صغيرة من العوامل الدوائية و الغير دوائية الأخرى.

الخلاصة: يعتبر التسمم الذاتي المتعمد عرضاً شائعاً بمركز علاج التسمم بمستشفيات جامعة عين شمس و تظهر الاتجاهات العامة غلبة المراهقين وصغار البالغين وخصوصاً الإناث، واستخدام العوامل الدوائية خاصة المؤثرة على الجهاز العصبي، وانخفاض الوفيات الناجمة و ارتباطها بشكل رئيسي بالمركبات الفسفورية العضوية.