

**Original Article****Evaluation of Suicidal Poisoning Cases admitted to Emergency Units of Assiut University Hospitals, Egypt****Noha Esmael Ebrahim<sup>1\*</sup>, Randa H. Abdel-Hady<sup>1</sup>, Gehad H. Eisa<sup>1</sup>, Eman S. Shaltout<sup>1</sup>**<sup>1</sup>Department of Forensic Medicine and Clinical Toxicology, Faculty of Medicine-Assiut University  
Egypt**ABSTRACT**

Suicide by poisoning has become a critical health problem. This accounts for a substantial percentage of suicidal cases globally, up to 85 % - 95 % of suicide-related hospital admissions. This study was aimed to investigate the prevalence, the associated risk factors of suicidal poisoning, and their outcome. **Subjects and methods:** In this cross-sectional study, 303 suicidal poisoning cases were admitted to Assiut University Hospital's emergency units between 1<sup>st</sup> January and 31<sup>st</sup> December 2020. The following data were collected from admitted cases: sociodemographic data, type of used poison, the severity of cases as evaluated by poisoning severity score, motivation behind suicide and the outcomes of suicide attempts. **Results:** The prevalence of suicidal poisoning among admitted cases was 25.25% and was common in age group 7 to 20 years old (49.2%). Females outnumbered males. The bulk of cases (66%) occurred in rural areas, with singles accounting for 70%, non-working people reported in 41.5% of cases, and the most common reason for suicide was familial agony, followed by financial concerns. Pesticides were the most commonly utilized toxin (69.6%); the first blamed agent was aluminum phosphide. Poisoning severity score grade 1 was recorded in 51.8%, and the cure rate was 72.6 % versus 22.8 % mortality rate in addition to 4.6% had an unclear prognosis.

**Conclusion:** Suicidal poisoning, as a public health concern, requires more attention in order to determine proper preventive events because it primarily affects young females who are experiencing familial distress for threatening their families and committing suicide by ingesting Aluminum phosphide tablets, which have a high fatality rate.

**Keywords:** Suicidal, Poisoning, Pesticides, Aluminum phosphide, Assiut, Egypt

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## I. BACKGROUND

Suicide is a public health issue that affects families, communities, and entire countries, with long-term consequences for those left behind (Pandey et al., 2019). Suicide has a global mortality rate of 16 individuals per 100,000, or one suicidal case every 40 seconds (Shlapko et al., 2020).

Suicide is a great problem in the Arab Middle East and North Africa (MENA) region, with 26,000 people dying by suicide in the Eastern Mediterranean Region in 2016 (Amini et al., 2021). According to World Health Organization (WHO) statistics, 7881 people committed suicide in Egypt in 2022, while 3022 people committed suicide in 2019 (Farahat et al., 2022).

Assiut is a governorate in Upper Egypt, has a population of above five million according to data published by the Central Agency for Public Mobilization and Statistics (CAPMAS, 2023). Rates of suicide by consuming poison are higher in developing countries, especially suicide by consuming a pesticide. In high-income countries, drugs used in attempts to commit suicide include psychotropic drugs, analgesics, antihistamines, antidepressants, psychoactive drugs, and sedative-hypnotics (Albano et al., 2022).

Deliberate self-poisoning (DSP) is a prevalent health problem that lead to increase number of adult suicide attempts in the last decades. It accounts for a substantial number of hospital admissions, most of which are young females (Kholeif, 2023).

Suicidal poisoning has significantly increased in recent years around the world. Thus, suicidal poisoning in Egypt was studied in lower governorates like Cairo (El Mahdy et al. 2010, Taha et al. 2011, Salah Eldin and Azim 2018), Alexandria (Kholeif, 2023), Tanta (Kasemy et al. 2022, El-Sarnagawy et al. 2022). Unfortunately, there are currently few studies in upper Egypt that investigated suicidal poisoning. So, it's vital to remember that every region has a variety of circumstances, such as the readily available poisons and level of education which affect the pattern of poisoning.

So, the aim of this study is to investigate the prevalence, the associated risk factors of suicidal poisoning in Assiut, representing the largest governorate in Upper Egypt in great detail, and their outcome for the purpose of proper preventive measures.

## II. SUBJECTS AND METHODS

Cross-sectional study was performed on acutely intoxicated cases, for a duration of 1 year from the 1<sup>st</sup> of January 2020 to the 31<sup>st</sup> of December 2020. The total number of poisoning cases admitted was 1200, out of which 303 were suicidal. The research was carried out at Assiut University Hospital's emergency unit and Assiut Pediatric University Hospital's emergency unit.

**Inclusion criteria:** cases above 7 years presented to the emergency units of Assiut university hospital with a history of suicidal poisoning.

**Exclusion criteria:** non-toxicological causes of suicide, malingerers and who refused to participate were excluded from the study.

From the admitted cases, a complete detailed history is obtained (either from the patient or from his/her relatives in the case of a comatose patient), and the following information was gathered:

- Sociodemographic data including age, gender, residence, occupation, educational level, and marital status.
- Type of used poison, time of ingestion, delay time and rout of exposure
- The severity of cases was evaluated by poisoning severity score (PSS) which is four grades (Persson et al., 1998):
  - 0 None: No symptoms or signs

- 1 Minor: Mild, transient and spontaneously resolving symptoms or signs
  - 2 Moderate: Pronounced or prolonged symptoms or signs
  - 3 Severe: Severe or life-threatening symptoms or signs
  - 4 Fatal: Death
- Previous history of the case including history of previous suicidal attempts, and history of chronic diseases and psychiatric diseases
  - Patient complaints, case examination, investigations, and management modalities.
  - Motivation behind suicide and the outcomes of suicide attempts.

### **Ethical approval:**

An informed valid consent was taken from the patients or parents. Approval from Institutional Review Board of Faculty of Medicine in Assiut University was obtained. IRP number: 1700988, protocol number: 2019-12-31-004.

### **Statistical analysis:**

The data was sorted and analyzed using the Statistical Package for Social Sciences (SPSS) version 25. Numbers and percentages were used to describe the qualitative data in this study. To describe quantitative data, the mean, standard deviation (SD), and range were employed. For unpaired groups, the Chi-square

test was applied for categorical data. In the event that the Chi-square test proved invalid, Monte Carlo tests were utilized. Odds ratio (OR) with confidence interval (CI) and Logistic Regression was calculated to measure the different risk factors for aluminum phosphide-related suicide attempts. The significance threshold was set at  $P < 0.05$  level (Bowers, 2006, McHugh, 2013).

### III. RESULTS

The socio-demographic data of the studied cases are present in Table 1. The most prevalent age group was 7 to 20 years (49.8%) followed by age group from 20 to 30 years (29.1%) and 30 to 40 years (13.5%). Individuals aged  $> 40$  to 75 years accounted for the lowest proportion (7.6%). The largest percent of participants were females (60.4%). The majority of cases (66.0%) lived in rural areas compared with 34% in urban areas. Regarding marital status, 70% of the cases were found to be single, followed by married persons (27%), divorced people (2%), and widows were less present at only 1%. The studied cases had intermediate and basic levels of education 38.6% and 38.0% respectively, while higher education and illiteracy were 9.9% and 13.5%, respectively. In terms of occupation, those who were not working and students accounted for the largest percent of cases (41.5%, and 35% respectively) while

workers and employers were 20.5%, and 3.0% respectively. Only 23 cases out of 303 cases had history of previous suicide attempts representing 7.6%

**Table (1): Socio- demographic data of suicidal poisoning cases at Emergency units of Assiut University hospitals from the 1st of January 2020 to the 31st of December 2020:**

Parameter	N=303	percent
<b>Age (years)</b>		
7 to 20	151	49.8%
> 20 to 30	88	29.1%
> 30 to 40	41	13.5%
> 40 to 75	23	7.6%
<b>Sex</b>	120	39.6%
Males		
Females	183	60.4%
<b>Residence</b>	200	66.0%
Rural		
Urban	103	34.0%
<b>Marital Status</b>	212	70.0%
Single		
Married	82	27.0%
Divorced	6	2.0%
Widow	3	1.0%
<b>Education</b>	30	9.9%
Higher		
Intermediate	117	38.6%
Basic	115	38.0%
Illiterate	41	13.5%
<b>Occupation</b>	106	35.0%
Student		
Employers	9	3.0%
Worker	62	20.5%
Not working	126	41.5%
<b>Previous attempts</b>	280	92.4%
Absent		
Present	23	7.6%

Pesticides group were the most utilized poison in suicidal poisoning (69.6%), but non-pesticide group include therapeutic drugs (25.7%), household agents (1.7%) and other poisons which represented 3.0% Table (2).

**Table (2): Categories of ingested poisons among cases admitted to Emergency units of Assiut university hospitals from the 1st of January 2020 to the 31st of December 2020**

Type of poison	N	percent
Pesticides	211	69.6%
Household products	5	1.7%
Drugs	78	25.7%
Others	9	3.0%
<b>Total</b>	<b>303</b>	<b>100%</b>

Aluminum phosphide tablets (AIP) were the most prevalent pesticide used (65.4%), followed by zinc phosphide (13.7%), organophosphates (12.3%), carbamate (8.1%), and boric acid (0.5%) Table (3).

**Table (3) Pesticides ingestion among suicidal poisoning cases admitted to Emergency units of Assiut university hospitals from the 1st of January 2020 to the 31st of December 2020**

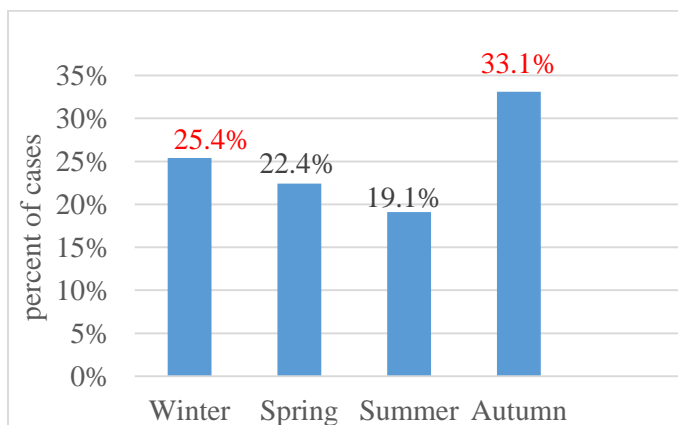
Pesticides	N	Percent
Aluminum phosphide	138	65.4%
Zinc phosphide	29	13.7%
Organophosphorus	26	12.3%
Carbamate	17	8.1%
Boric acid	1	0.5%
<b>Total</b>	<b>211</b>	<b>100%</b>

Non-pesticide group include: Antipsychotic drugs which accounted for 13%, anticonvulsants (10.8%), paracetamol (7.6%), and anxiolytics (6.5%). Antihypertensive medications, oral hypoglycemic pills, and nonsteroidal anti-inflammatory drugs (NSAIDs) accounted for each 5.4%. Antidepressant medications, chlorine, and theophylline each accounted for 4.3%. Aspirin, unknown, mixed, and lipid-lowering medicines were each consumed by 3.3%. Antibiotics, Fertilizers, antihistaminic medications and dietary supplements and vitamins accounted for each 2.2%. While digitalis, obesity drugs, anti-vertigo pharmaceuticals, anti-parkinsonism, L-thyroxine, steroids, iron pills, antiemetic drugs, phenol and hydrocarbon accounted for each 1.1% Table (4)

**Table (4): Non-pesticide agents ingested by suicidal poisoning cases admitted to Emergency units of Assiut University from the 1st of January 2020 to the 31st of December 2020:**

Parameter	N	Percent	Parameter	N	Percent
Antipsychotic drugs	12	13%	Fertilizers	2	2.2%
Anticonvulsant drugs	10	10.8%	Antibiotics	2	2.2%
Paracetamol	7	7.6%	Antihistaminic	2	2.2%
Anxiolytic drugs	6	6.5%	Dietary supplements and vitamins	2	2.2%
Oral hypoglycemic drugs	5	5.4%	Anti-parkinsonism	1	1.1%
NSAID	5	5.4%	L-thyroxine	1	1.1%
Antihypertensive drugs	5	5.4%	Steroids	1	1.1%
Antidepressant drugs	4	4.3%	Obesity drugs	1	1.1%
Theophylline	4	4.3%	Iron	1	1.1%
Chlorine	4	4.3%	Digitalis	1	1.1%
Aspirin	3	3.3%	Ant vertigo drugs	1	1.1%
Lipid lowering medication	3	3.3%	antiemetic drugs	1	1.1%
Unknown	3	3.3%	Phenol	1	1.1%
Mixed	3	3.3%	hydrocarbon	1	1.1%
<b>Total</b>	92				

Regarding seasonal variation of suicidal poisoning cases, autumn accounted for 100 cases (33.1%), followed by winter 77 cases (25.4%), spring 68 cases (22.4%), and summer 58 cases (19.1%) Figure (1).

**Figure (1): Seasonal variation among suicidal poisoning cases admitted to Emergency units of Assiut university hospitals from the 1st of January 2020 to the 31st of December 2020.**

46 cases (15.2%) attended the emergency units within  $\leq 1$  hours, 11 cases (3.6%) within 1.5 hours, 84 cases (27.7%) within 2 hours, 2 cases (0.7%) within 2.5 hours, 69 cases (22.8%) within 3 hours, 60 cases (19.8%) within 4 hours, and 31 cases (10.2%) presented to hospitals within  $> 4$  hours Table (5).

**Table (5): Delay time after poison ingestion among suicidal poisoning cases from the 1st of January 2020 to the 31st of December 2020:**

Delay (hour)	N	Percent
≤1h	46	15.2%
1.5h	11	3.6%
2h	84	27.7%
2.5h	2	0.7%
3h	69	22.8%
4h	60	19.8%
>4h	31	10.2%
<b>Total</b>	<b>303</b>	<b>100%</b>

There is a relation between type of poison and sex of the studied cases. A significant suicide attempts with pesticides, and drugs was observed among females (61.8% and 33.3%, respectively) compared to males (81.6% and 14.2% respectively) (P value = 0.001). Also, changes in types of used poisons were observed in suicidal poisoning cases whatever their occupational status (P value = 0.063) Table (6)

**Table (6): Chi square statistical results of the relationship between type of poison, sex and occupation among the studied Cases.**

Parameter	Type of poison				$\chi^2$	P
	Pesticides (n=211)	Household (n=5)	Drugs (n= 78)	Others (n=9)		
<b>Sex</b>						
Female	113(61.8%)	3 (1.6%)	61(33.3%)	6 (3.3%)	<b>14.620<sup>a</sup></b>	<b>0.001*</b>
Male	98 (81.6%)	2 (1.7%)	17(14.2%)	3 (2.5%)		
<b>Occupation</b>					<b>11. 674<sup>a</sup></b>	<b>0.063</b>
Students	66(62.3%)	2(1.9%)	36(34%)	2(1.9%)		
Worker	59(83.1%)	1(1.4%)	10(14.1%)	1(1.4%)		
Not working	86(68.3%)	2(1.6%)	32(25.4%)	6(4.8%)		
$\chi^2$ : Chi-square test                      n = number                      *: statistically significant						

The chi-squared test illustrated a significant relationship between suicide motivation and gender ( $P$  value= 0.000), as females more likely to attempt suicide due to familial, followed by educational reasons (77% and 13.7% respectively), while males tended to do so for familial (50%) and financial reasons (30.8%). Regarding motivation behind suicide in different age groups, familial causes were

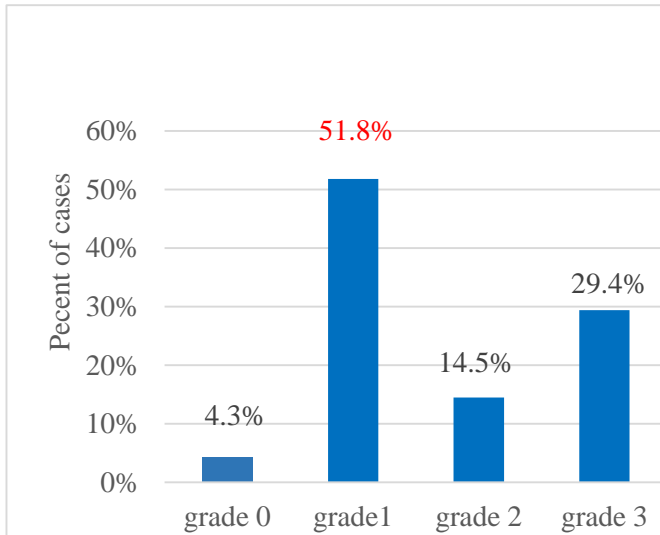
prominent for suicidal poisoning in all age groups. Besides that, in age group from 7 to 20, educational causes accounted for 23.8%, while financial reasons were common in age groups from >20 to 30 and from >30 to 40 (19.3% and 24.4%, respectively). For individuals aged >40 to 75, psychological reasons constituting 26.1% were mentioned after familial causes (52.2%) ( $P$  value=0.000) Table (7).

**Table (7): Chi square statistical results of the relationship between motivation behind suicide, age, sex and marital status among the studied cases.**

Parameter	Motivation behind suicide					$\chi^2$	$P$
	Financial (n=42) 13.9 %	Educational (n=37) 12.2%	Familial problems (n= 201) 66.3%	Psychological (n=20) 6.6 %	Physical (n=3) 1.0%		
<b>Sex</b>						<b>51.240<sup>a</sup></b>	<b>0.000*</b>
Female	5(2.7%)	25(13.7%)	141(77%)	11(6%)	1(0.5%)		
Male	37(30.8%)	12(10%)	60(50%)	9(7.5%)	2(1.7%)		
<b>Age groups (years)</b>						<b>76.346<sup>a</sup></b>	<b>0.000*</b>
7 to 20	12(7.9%)	36(23.8%)	96(63.7%)	7 (4.6%)	0(0%)		
> 20 to 30	17(19.3%)	0(0%)	65(73.9%)	6 (6.8%)	0(0%)		
> 30 to 40	10(24.4%)	1(2.4%)	28(68.4%)	1 (2.4%)	1(2.4%)		
> 40 to 75	3(13%)	0(0%)	12(52.2%)	6 (26.1%)	2(8.7%)		
$\chi^2$ : Chi-square test      n = number      *: statistically significant							

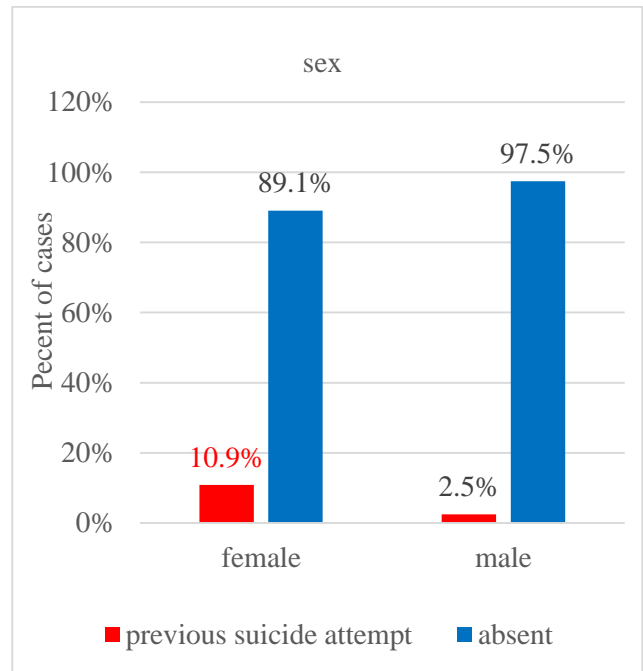


According to poisoning severity score, PSS grade 1 was recorded in 157 cases (51.8%), followed by grade 3 (89 cases (29.4%)), grade 2 (44 cases (14.5%)), and grade 0 (13 cases (4.3%)) Figure (2).



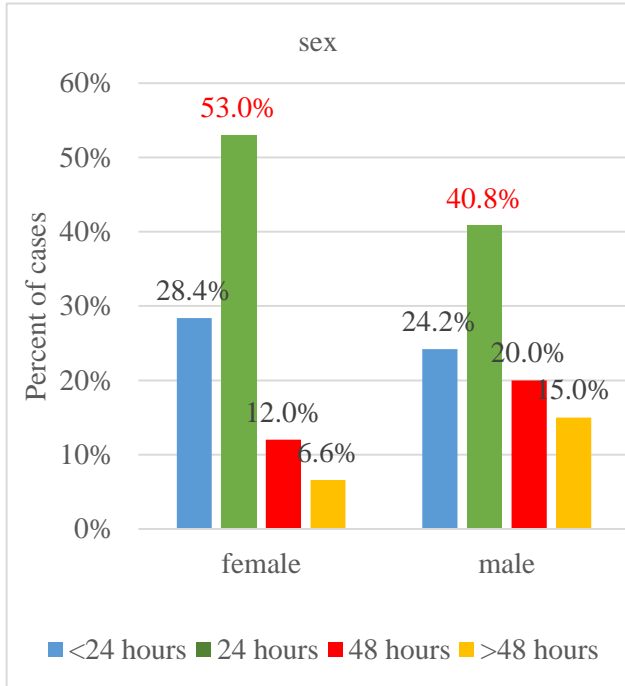
**Figure (2): Poison Severity Score (PSS) of suicidal poisoning cases admitted to Emergency units of Assiut university hospitals during the period from 1<sup>st</sup> of January 2020 to 31<sup>st</sup> of December 2020.**

Previous suicide attempts were significantly common in females (10.5%) compared to male’s previous attempts (2.5%) (P value = 0.004) Figure (3).



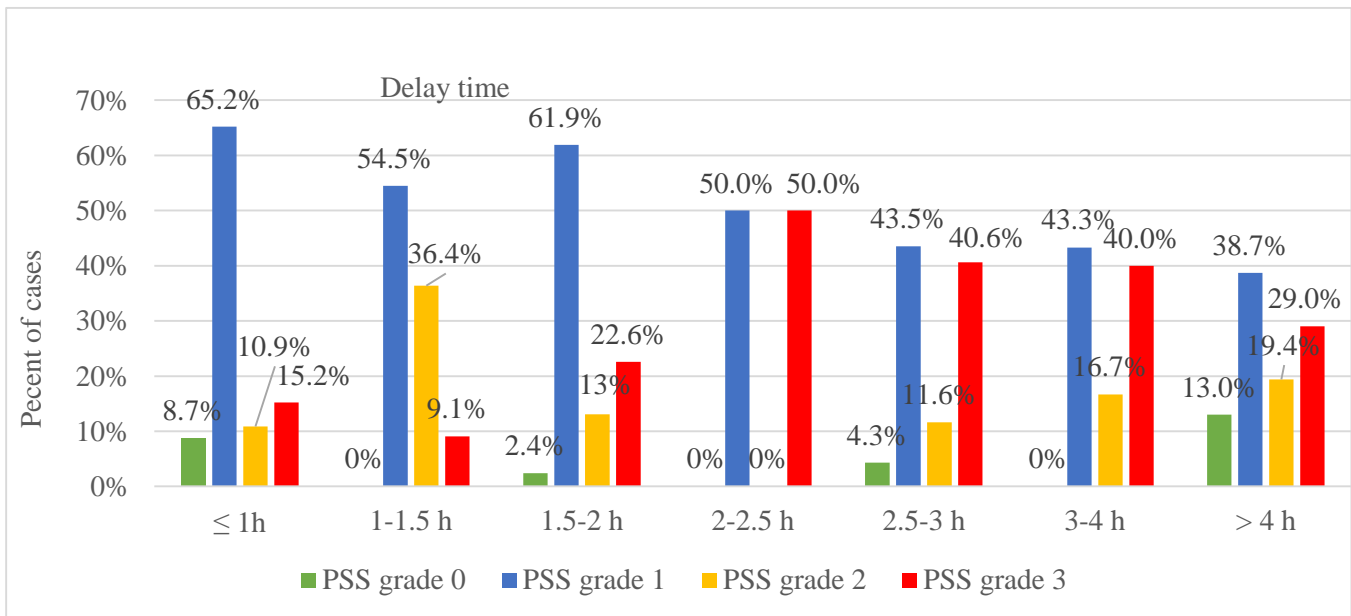
**Figure (3): Relationship between sex and previous suicidal attempt among the studied cases**

Significant differences in periods of hospital stay were observed (p value = 0.011) as females stayed in hospital for 24 hours and less than 24 hours (53% and 28.4%, respectively) compared to 40.8 % and 24.2% in males Figure (4).



**Figure (4): Relationship between sex and length of hospital stay among the studied cases.**

Delay time after ingestion of poison and PSS showed significant difference (p value = 0.011) as delay time increases, the PSS becomes severe. We reported that 65.2% of cases arrived the hospital within 1 hour presented with minor symptoms (PSS grade 1). Within 2 hours, 61.9% presented with PSS grade 1, and 22.6% presented with severe manifestation, while 40% of cases attended the hospital within 4 hours were recorded as PSS grade 3 Figure (5)



**Figure (5): Relationship between Poison Severity Score (PSS) and delay time after ingestion among the studied cases**

Regarding risk factors of suicide by AIP based on logistic regression model it was found that the strongest predictor of suicide by AIP was sex (OR= 2.496; p = 0.001), psychiatric diseases (OR= 0.130; p = 0.002), socioeconomic status (OR= 0.420; p = 0.034), and occupation (OR= 0.586; p = 0.050). Males have 2.496 times the risk of suicide by AIP compared to females, people

with psychiatric disease has 87% less risk compared to people with non-psychiatric disease, people with high socioeconomic status has 58% less risk compared to people with low socioeconomic status and working people has 42% less risk compared to non- working people but insignificant relation Table (8)

**Table (8): Risk factors of suicide by aluminum phosphide (AIP) based on logistic regression model.**

Variables	B	S.E.	Wald	df	OR (95% C.I.)	P. value
Sex (male=1, female=0)	0.915	0.273	11.260	1	2.496(1.463-4.260)	0.001
Psychiatric diseases (Absent=0, Present=1)	-2.038	0.647	9.916	1	0.130(0.037-0.463)	0.002
Socioeconomic status (low=0, high=1)	-0.867	0.408	4.509	1	0.420(0.189-0.935)	0.034
Occupation (Not worked=0, Worked=1)	-0.534	0.273	3.831	1	0.586(0.343-1.001)	0.050

#### IV. DISCUSSION

Suicidal poisoning is a prevalent method of suicide. Understanding its epidemiology, risk factors, and outcomes is crucial for effective prevention. Using a previously designed sheet and clinical examination, this cross-sectional study was conducted in the Emergency Units of Assiut University Hospitals from Assiut University Hospitals from the 1st of January 2020 to the 31<sup>st</sup> of December 2020. Three hundred and three of the 1200 poisoning cases hospitalized in this period were suicidal.

In the present study, prevalence of suicidal poisoning (25.25%) aligns with studies in Western Saudi Arabia performed by

Bakhaidar et al., (2015), who reported that its prevalence was 28.46%. but varies in other regions as El-Farouny & Helmy, (2021), in Menoufia Poison Control Center (MPCC), and Sarnagawy et al., (2022) in Tanta University Poison Control Center (TUPCC), stated that the prevalence of suicidal poisoning was(33%, and 85.04% respectively).

In this study, the 7-20 years group was most affected (49.8%) followed by the age group > 20 to 30 years (29.1%), with a clear gender difference (60.4% females). Rural areas saw a higher incidence (66%), and singles exhibited the highest suicide rate (70%).

The study aligns with previous research performed by El-Farouny & Helmy (2021) and Sarnagawy et al. (2022) conducted at MPCC and TUPCC, respectively. They found that the predominant age group for suicidal poisoning was between 10-20 years, and a mean age of  $25.9 \pm 10$  years for the patients respectively. Additionally, women were more likely to be affected, and a significant proportion of cases originated from rural regions (78.7% and 72.4%, respectively). In terms of marital status, single individuals had the highest suicide rate, accounting for 59.2% and 61% of cases, respectively.

These findings contradict reports suggesting higher suicide rates in older individuals in developed countries Osborne et al. (2017). Chaudhari et al. (2022) in South India reported a male predominance (61%), while Rasheed et al. (2022) in Pakistan found that the majority of suicide cases occurred in urban settings (92%) and involved married females (68%).

In the current study, a significant proportion of victims had intermediate (38.6%) and basic (38%) education levels, and the most affected groups were non-working individuals (41.5%) and students (35%). These findings are consistent with the research of Bjornaas et al. (2010) in Oslo, where almost a third of poisoning cases involved individuals

who had completed the mandatory nine years of primary and secondary school, and 33% were students, while 16% were unemployed. Additionally, Sarnagawy et al. (2022) at TUPCC reported that 61.8% of their cases had secondary-school education.

However, these results contradict the WHO findings that occupation is unrelated to suicidal behavior in some countries Kordrostami et al. (2017). Furthermore, Patel et al. (2020) in India found that the majority of participants in their study were well-educated, holding at least a high school diploma (65.3%).

In the present study, the peak of suicidal poisoning occurred among those with no prior suicide attempts (92.4%). This agreed with Khajedaluae et al., (2021) in Iran who found that persons who had never attempted suicide had the greatest rate of suicide behavior. But disagreed with Thumtecho et al., (2022), In Thailand, who reported that 61.8% had previous suicide attempts.

Pesticides particularly AIP tablets (65.4%), were the most common substances used (69.6%) followed by therapeutic drugs (25.7%), household agents (1.7%) and other poisons (3%). This agreed with Patel et al., (2020), in India found that nearly one third of all cases committed suicide by AIP tablets. Sarnagawy et al., (2022), in TUPCC, stated that the most common causative poison was

phosphides (19.7%). Rasheed et al., (2022), in Pakistan, reported that pesticides were the most common (50%).

In contrast, previous research reported that the majority of suicide attempts in the years 1999–2020 were related to neuroleptic and antipsychotic poisonings according to Staniszewska et al., (2022) in Poland. Fusaroli et al., (2023), in USA, reported that pharmaceutical agents (96.4%) and paracetamol, were the main drug reported.

Suicidal poisoning showed seasonality, with higher incidents in autumn (33.3%) and winter (25.4%). This is consistent with Fusaroli et al., (2023) in USA who stated that higher peaks was in the winter and lower peaks in June. However, many researches on suicide seasonality conducted in Iran by Shokrzadeh et al., (2017) found that the frequency of suicidal cases increased in the spring and early summer

Prompt medical attention varied, with 15.2% presenting within  $\leq 1$  hour and 27.7% within 2 hours and 10.2% within  $>4$  hours. This agreed with Shokrzadeh et al., (2017), in Iran who found that 41.71% of poisoned cases presented to hospital with a delay time of 1-3 hours. But in contrast with Kandeel & El-Farouny, (2017) at MPCC who found that 20% of poisoned cases were admitted within 2 hours of intoxication.

The study found a statistically significant association between the sex of individuals and the type of poison consumed. Females predominantly ingested pesticides (61.8%), and drugs (33.3%) for suicide but males consumed pesticides (81.6%). Nesam et al (2021) in Chennai, Tamil Nadu, reported that females were more likely to be poisoned by tablets, and herbicide poisoning was more common among males. Mahmoudi et al. (2020) in Iran and El-Farouny & Helmy (2021) at MPCC, found no significant sex-based differences in the type of ingested poison.

There was no significant association between the occupation of individuals and the type of poison ingested. These findings agreed with Mahmoudi et al. (2020) study in Iran, which reported no significant relation between suicide methods (pesticides or drugs) and occupation.

A statistically significant difference was observed in the outcome based on the type of poison used whereas all suicidal poisoning cases using household agents and other poisons followed by 96.1% of cases using drugs cured, while 62% of suicide cases used pesticides die. This aligns with El-Farouny & Helmy's (2021) at MPCC and Fayed & Sharif (2021) in TUPCC, reporting high mortality rates (88.2% and 83.7%) from pesticide/AIP poisoning.

Gender differences were evident, with females attributing suicide to familial and educational issues (77% and 13.7%, respectively), while males cited financial (30.8%) after familial causes (50%). Sweilum and Kandeel (2016) at MPCC noted educational issues more common among females. Young males commit suicide after financial issues, according to Gharbaoui et al., (2019) in Tunisia and Chaudhari et al. (2022) in South India observed gender variations in suicide motivations.

The study explores age-specific causes of suicide, revealing statistically significant patterns. In the age group from 7 to 20 years, familial causes accounted for 63.6%, while the age group from > 20 to 30 years saw 73.9% attributing suicide to familial issues and 19.3% to financial causes. Those aged >40 to 75 years cited psychological causes (26.1%) after familial issues (52.2%). These findings align with El-Farouny & Helmy (2021), at MPCC emphasizing family troubles as a significant motive in the 10-20 age group. In contrast, Mahmoudi et al. (2020) in Iran highlighted psychological factors in the 20-29 age group and financial causes in the 30-39 age group.

Poisoning severity score analysis revealed mild cases (PSS grade 1) in 51.8%, with 29.4% severe cases. Sweilum & Kandeel, (2016) reported that more than half of suicidal

poisoning cases admitted to MPCC were classified as mild, more than one fourth of cases were moderate cases and 7.9% were severe cases. Other studies conducted by Ali et al., (2020) in the UAE stated that 82% of the patients were graded as minors on poison severity scale. Thumtecho et al. (2022) in Thailand reported that around 90% of cases were assessed as asymptomatic to minor in severity at the time of presentation.

A significant gender disparity was evident in prior suicide attempts, as 10.9% of females had a history of attempts, whereas only 2.5% of males do. Consistent findings from Patil et al. (2014) in Navi Mumbai and Khajedaluee et al. (2021) in Iran suggested that females attempting suicide 2-3 times more frequently than males.

Statistically significant variations in hospitalization durations were noted, specifically 53% of females stayed for 24 hours and 28.4% for less than 24 hours, in contrast to males, where 40.8% stayed for 24 hours and 24.2% for less than 24 hours. Comparable results were noted by Zyoud et al. (2010) in Malaysia

A significant relationship was found between the delay time after ingestion and PSS of patients. The highest number of cases arrived the hospital within 1 hour presented with minor symptoms (PSS grade 1). Within 2

hours, 61.9% presented with PSS grade 1, and 22.6% presented with severe manifestation, while 40% of cases attended the hospital within 4 hours were recorded as PSS grade 3. These findings align with Zakharov et al. (2013) in Prague, indicating a higher level of intoxication in cases arriving more than 4 hours after a suicide attempt

In this study, it was found that gender strongly influenced the likelihood of suicide (odds ratio, OR = 2.496), as well as the presence of psychiatric diseases (OR = 0.130), socioeconomic status (OR = 0.420), and occupation (OR = 0.586). In a study conducted by Rasouli et al. (2019) in Iran, a significant predictor of suicide was the deceased's history of previous suicide attempts (OR = 9), and unemployment was identified as a strong predictor as well (OR = 5). According to a meta-analysis by Favril et al. (2022), the most substantial risk factors for suicide included social isolation, unemployment, and low socioeconomic status. The study sample was from one governorate so that our finding could not be generalized, COVID-19 incidence was responsible for decrease number of presentations of suicide cases to Assiut University Hospitals besides the type of the study as a cross-sectional analysis was not feasible for long-term follow-up of the sample population.

## V. CONCLUSIONS

In this study, these data provide vital information on the prevalence of suicide poisoning cases in Assiut University Hospital's Emergency units throughout the COVID-19 pandemic lockdown. They accounted for 25.25% of total admitted poisoned cases that reached 1200. Regarding the substances used in suicide attempts, it was found that pesticides were used in 69.6% of cases, especially AIP tablets (64.9%) due to their easy accessibility and low price. Pesticide toxicity, particularly AIP tablets, has also been observed to harm young, single, and unemployed females. The outcome of suicidal poisoning was also detected.

## VI. RECOMMENDATIONS

Urgent steps are needed, including psychoeducational campaigns on mental health and suicide to raise awareness among the most vulnerable, staff training, and medical resources for prompt treatment of self-poisoning and updated governmental policy to regulate the use of extremely fatal pesticides that are widely used for suicide, particularly aluminum phosphide. The government should make practical efforts to limit the procurement of agricultural toxins so that they are not readily available to anyone with suicidal thoughts.



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Not applicable

**VIII. Competing interests**

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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## الملخص العربي

### تقييم حالات الانتحار بالتسمم بوحدات استقبال الطوارئ في مستشفيات أسيوط الجامعية ، مصر

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**خلفية البحث:** أصبح الانتحار بالتسمم مشكلة صحية حرجة. ويمثل هذا نسبة كبيرة من حالات الانتحار على مستوى العالم، تصل إلى ٨٥-٩٥٪ من حالات دخول المستشفيات المرتبطة بالانتحار. وتهدف هذه الدراسة إلى دراسة مدى انتشار عوامل الخطر المرتبطة بالتسمم الانتحاري ونتائجها وتأثير الإغلاق بسبب جائحة كوفيد-١٩ على نمط الحالات المعروضة. **طريقة البحث:** في هذه الدراسة المقطعية، تم إدخال ٣٠٣ حالة إلى وحدات الطوارئ بمستشفى أسيوط الجامعي في الفترة من ١ يناير إلى ٣١ ديسمبر ٢٠٢٠. وتم جمع البيانات التالية من الحالات التي تم قبولها: البيانات الاجتماعية والديموغرافية، ونوع السم المستخدم، وخطورة الحالات التي تم تقييمها وفقاً لدرجة شدة السمية، والدافع وراء الانتحار ونتائج محاولات الانتحار. **النتائج:** من بين ١٢٠٠ حالة تسمم تم إدخالها عام ٢٠٢٠ بلغ معدل انتشار التسمم الانتحاري ٢٥,٢٥٪ وكان شائعاً في الفئة العمرية من ٧ إلى ٢٠ عامًا (٤٩,٢٪) وكان عدد الإناث يفوق عدد الذكور وحدث الجزء الأكبر من الحالات (٦٦٪) في المناطق الريفية بين الأشخاص الغير متزوجين بنسبة ٧٠٪ وكان (٤١,٥٪) أشخاص لا يعملون والسبب الأكثر شيوعاً للانتحار هو المعاناة العائلية، تلبها المخاوف المالية وكانت المبيدات الحشرية هي السموم الأكثر استخداماً (٦٩,٦٪)؛ أكثرهم فوسفيد الألومنيوم. وسجلت حالات التسمم من الدرجة الأولى (٥١,٨٪)، وكان معدل الشفاء (٧٢,٦٪) مقابل (٢٢,٨٪) للوفيات والذي كان بشكل رئيسي بسبب فوسفيد الألومنيوم بالإضافة إلى (٤,٦٪) كان التشخيص غير واضح.

**الاستنتاج:** التسمم الانتحاري كونه أحد اهتمامات الصحة العامة، يتطلب المزيد من الاهتمام لتحديد الإجراءات الوقائية المناسبة لأنه يؤثر في المقام الأول على الشباب اللاتي يعانين من مشاكل عائلية بغرض تهديد أسرهن عن طريق الانتحار بفوسفيد الألومنيوم المسئول عن أعلى معدل للوفيات.

**التوصيات:** الحاجة الي خطوات جادة تشمل:

- حملات التثقيف النفسي حول الصحة العقلية والانتحار لرفع مستوى الوعي بين الفئات الأكثر ضعفاً.
- تدريب الموظفين.
- توفير الموارد الطبية للعلاج الفوري من التسمم الذاتي.
- تحديث السياسة الحكومية لتنظيم استخدام المبيدات الحشرية القاتلة للغاية والتي تستخدم على نطاق واسع. للانتحار، وخاصة فوسفيد الألومنيوم.
- يجب على الحكومة أن تبذل جهوداً عملية للحد من شراء السموم الزراعية بحيث لا تكون متاحة بسهولة لأي شخص لديه أفكار انتحارية.

