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Dr. Sathvik G
Post Graduate, Department of
General Medicine, Rajah
Muthiah Medical College and
Hospital, Chidambaram, India

Dr. R Aswinth
Assistant Professor,
Department of General
Medicine, Rajah Muthiah
Medical College and Hospital,
Chidambaram, India

Dr. S Sudharsan
Professor, Department of
General Medicine, Rajah
Muthiah Medical College and
Hospital, Chidambaram, India

A study on demographic, clinical and prognostic profile of pesticide poisoning cases in a rural tertiary care medical college hospital

Dr. Sathvik G, Dr. R Aswinth and Dr. S Sudharsan

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Abstract

To determine the demographic, clinical and prognostic profile of pesticide poisoning cases along with various parameters like age group, sex, marital status, compound consumed, clinical features of the poison consumed, comorbid illnesses, associated psychiatric illness, previous suicidal attempts, duration of stay and prognosis of patients who have consumed various forms of poison.

Methods: Our study was a hospital based prospective study, 500 cases of acute poisoning admitted under Department of Medicine of Rajah Muthiah Medical College Hospital were studied from October 2019 to October 2021. Patients included in the study are more than 14 years old. Patients less than 14 years, patients who have consumed plant poisons, unknown poison, Tablet poisoning were excluded. The socio-demographic profile of all cases of poisoning attended in emergency department or admitted in medical ward were collected on a suitably designed pre-structured proforma and analyzed.

Results: Of the 500 patients, Majority were in the age group of 18-30 years with males (57.40%) dominating the females (42.6%). Married couples (78%) were found to be more affected. Incidence of poisoning was more common in Rural areas (95.8%). The commonest symptoms were vomiting (46.8%) and salivation (40%). The most common poison used are insecticides followed by rodenticides. The mean duration of hospital stay was 4 to 5 days. 69 patients were admitted in the Intensive care. Most of the patients had mild disease (88.2%) and mortality rate was (3%). Majority of the patients had suffered from adjustment disorder.

Conclusion: This study has indicated that young married males from rural populations are at a higher risk of pesticides poisoning. And the most common poison used being insecticides followed by rodenticides. Pesticide poisoning is increasing in incidence and it is one of the preventable public health problems and includes mainly the patients in the age group of 18-30 years. Due to easy, availability of, Pesticides it is the most preferred method of. suicide, the main reason being adjustment disorder.

Keywords: Pesticide poisoning, demographic, clinical profile, prognostic profile, tertiary care center

Introduction

Agriculture is the major component of Indian economy. One of the important steps in the agricultural revolution in the modern world is usage of pesticides. Pesticides are a class of toxic substances that are intentionally released into the environment.

In our country, agriculture is still labor-intensive. Agricultural workers are exposed to many chemicals at various stages of formulation, manufacturing and spraying of pesticides in the farm. Pesticides have got both acute, sub acute and chronic health hazards upon exposure. Toxicity mainly results either by deliberate self-harm or accidental exposure during occupational activities. However it is the deliberate self-poisoning that causes majority of the deaths and a difficult health strategy to manage among health services, especially in Asia. Poisoning constitutes about 60% of self-harm in rural Asia. Around the world, an estimated 3,050,000 people are exposed to organophosphate compounds every year. The documented fatalities include 300,000 every year.

OPC was first synthesized by Schrader during the Second World War. OPC was initially used as an agricultural insecticide and later as potential chemical warfare agent. Organo phosphorus compounds (OPC) mainly accounts for 80% of pesticide poisoning in developing countries, because of its easy accessibility. Ravi *et al.* described that in India the incidence of OPC poisoning as around 1.26 lakhs during the year 2007. Around 92,000 deaths were due to OPC poisoning in the year 2010.3

Corresponding Author:
Dr. Sathvik G
Post Graduate, Department of
General Medicine, Rajah
Muthiah Medical College and
Hospital, Chidambaram, India

Methodology

Five hundred patients with acute poisoning admitted to Rajah Muthiah medical college hospital, Annamalai University from October 2019 to October 2021 were included in the study.

Inclusion, criteria: Age >14yrs, patient. Who. Hsave. consumed. Insecticides, rodenticides, herbicides, fungicides, Molluscicides, Acaricides, Nematicides.

Exclusion criteria: Patients with age less than 14yrs, patients who have consumed plant poisons (oleander, abrus, datura), Tablet poison, unknown poison.

Results

Table 1: Age Distribution

Age	No. of patients	Percentage
14-18	10	2.0
18-30	154	30.8
31-40	125	25.0
41-50	99	19.8
51-60	53	10.6
>60	59	11.8

It is inferred from Table 1 that, the common age of the patients was 18 to 30 years representing 30.8% followed by 31 to 40 years where 25% of the patients were observed. In the age category 41 to 50 years, 19.8% was noted. There were 11.8% in the age group >60 years and 10.6% in the age classification of 51 to 60 years. The youngest patient is years old, whereas the oldest is years old.

Table 2: Gender distribution of the study patients

Gender	N	%
Male	287	57.4
Female	213	42.6
Total	500	100

Gender distribution is shown in Table 2. The majority of the study patients were male, 57.4%. The female patients reported were 42.6%.

Table 3: Distribution of patients with reference to areas

Area	N	%
Rural	479	95.8
Urban	21	4.2
Total	500	100

It is inferred from Table 3 that, the most of the study patients were from rural areas, 95.8%.

Table 4: Marital status of the study patients

Marital status	N	%
Married	390	78.0
Unmarried	110	22.0
Total	500	100

The marital status is presented in Table 4. 78% of the study patients were married.

Table 5: Comorbidities of the study patients

Comorbidities	N	%
Bronchial asthma	1	0.2
COPD	2	0.4
Systemic Hypertension	41	8.2
Type 2 Diabetes	64	12.8
Systemic Hypertension, Type 2 Diabetes	5	1.0
Hypothyroidism	2	0.4
Type 2 Diabetes, CKD	1	0.2
Nil	387	77.4
Total	500	100

It is inferred from Table 5 that 77.4% of the study patients were not associated with comorbidities. Diabetes was observed in 12.8% hypertension was noted in 8.2%.

Table 6: Distribution of poisonous compound

Compound	N	%
1.Rat killer (Paste, Powder, Cake)	143	28.6
2.Organophosphorus	100	20.0
Ant killer powder	127	25.4
Propargite	2	0.4
Monocrotofos	13	2.6
Kurunai	5	1.0
Organochlorine	1	0.2
Quinalphos+Dimethylbenzene	2	0.4
Profenofos+Cypermethrin	9	1.8
Chlorpyrifos+ Cypermethrin	9	1.8
Phorate	13	2.6
Dimethoate	1	0.2
3.Organochlorine	1	0.2
4.Carbamate	1	0.2
5.Herbicide	9	1.8
Paraquat	2	0.4
Diquat	1	0.2
6.Allout	1	0.2
7.Cockroach killer	1	0.2
8.Fungicide	1	0.2
Total	500	100

The distribution of poisonous compound is presented in Table 6. The common poisonous compound consumed by the patients were rat killer (28.6%), ant killer (25.4%) and organophosphorus (20%).

Table 7: Severity of the patients condition

Severity	N	%
Mild	441	88.2
Moderate	50	10.0
Severe	9	1.8
Total	500	100

Severity of the Patients condition is presented in Table 7. It is inferred that most of the patients had mild severity (88.2%).

Table 8: Types of pesticides

Groups	N	%
Herbicide	10	2%
Insecticide	345	69%
Rodenticide	141	28.2%
Fungicide	4	0.8%
Total	500	100

It is inferred from Table 8 that the common pesticide consumed was insecticide, 69%, followed by rodenticide, 28.2%.

Table 9: Clinical features of the study patients

Clinical features	N	%
Muscarinic		
S	150	41.78
L	15	4.1
U	14	3.8
D	35	9.7
G	11	3.06
E	134	37.32
Total	359	100

Clinical feature of the study patients is presented in Table 9. Salivation was the common feature, 41.78% followed by emesis (37.32%) defecation (9.7%), lacrimation (4.1%) and urination (3.8%). GI distress was observed in 3.06%.

Table 10: Duration of hospital stay

Duration of stay	N	%
2 to 3 days	118	23.6
4 to 5 days	293	58.6
6 to 7 days	55	11.0
8 to 10 days	23	4.6
11 to 15 days	8	1.6
16 to 20 days	3	0.6
Total	500	100

It is inferred from Table 10 that, the mean duration of hospital stay was 4 to 5 days, 58.6% Followed by 2 to 3 days (23.6%). 4.6% of patients had hospital stay of 8 to 10 days. 1.6% had hospital stay between 11 to 15 days.

Table 11: ICU stay of the study patients

ICU stay	N	%
Yes	69	13.8
No	431	86.2
Total	500	100

It is inferred from Table 11 that 13.8% had required ICU admission whereas most of the patients did not need ICU care (86.2%).

Table 12: Psychiatric illness of the study patients

Psychiatric evaluation	N	%
Adj disorder	434	86.8
Alcohol dependence syndrome	27	5.4
Chronic depression	8	1.6
Depression	11	2.2
Total	500	100

In table 12 psychiatric analysis showed 434 patients suffered from adjustment disorder.

Table 13: Data regarding previous suicide attempts

Previous attempts	N	%
NO	421	84.2
Yes		
1 time	47	9.4
2 times	26	5.2
3 times	6	1.2
Total	500	100

It is observed from Table 13 that most of the patients had consumed poison for the first time, one attempt - 9.6% and two times attempt was 5.2%, 3 times 1.2%.

Table 14: Outcome of the condition

Outcome	N	%
Cured	471	94.2
Death	15	3.0
Others	14	2.8
Total	500	100

It is inferred from Table 14 that most of the patients were completely cured, 94.2%. 14 patients died due to poisoning.

Discussion

In this study, pesticide poisoning was most prevalent in the age group of 18-30yrs. 388 cases out of 500 were below the age of 50yrs.

Table 15: Comparing the Age Group with Other Studies

Study Name	Age Group (years)
Our study	18-30yrs (30.8%)
B. Maharani <i>et al.</i>	21-30yrs (49.33%)
Suhail Sidiq <i>et al.</i>	15-25yrs (54.9%)
T. Selvaraj <i>et al.</i>	21-40yrs (67%)
Bhandari B <i>et al.</i>	20-30yrs (39%)

This trend of highest number of cases in 21-40 years of age group is due to more work pressure, family problems, economical stress and other life settlement problems in this age group.

Table 16: Comparing Gender Distribution with Other Studies

Study Name	Male	Female
Our study	287(57.4%)	213(42.6%)
Maharani <i>et al.</i>	92(61.33%)	58(38.66%)
T.Selvaraj <i>et al.</i>	599(61%)	383(39%)
Suparna Chatterjee <i>et al.</i>	338(57.09%)	254(42.91%)
Suhail Sidiq <i>et al.</i>	33(32.35%)	69(67.64%)
Bhandari B <i>et al.</i>	36(23.20%)	126(76.80%)
Polchrel <i>et al.</i>	186(32%)	396(43%)

In this study the total number of patients were 500. Among them 287 of them were male (57.4%) and 213 of them were female (42.6%), showing that the incidence of poisoning is more in males (Table 2). Various studies conducted in Salem by B. Maharani *et al.*, Madurai by T. Selvaraj *et al.* and in West Bengal by Suparna Chatterjee *et al.* had patterns similar to this study with male predominance [1]. Whereas studies by Suhail Sidiq *et al.* and Bhandari B *et al.* had female predominance [2]. A similar male preponderance was found in other studies. In contrast to this, Pokhrel *et al.* had reported a high incidence among females [3]. An equal incidence of acute poisoning was observed by Meeran *et al.* in both males and female [4]. This higher incidence of poisoning in men as compared to women may be due to the difference in methods to deal with stress of daily life, easy accessibility to poisonous substance, pattern of alcohol

consumption and difference in care seeking rates for mental disorder.

Table 17: Comparing Distribution of Patients with Reference to Areas

Study name	Rural	Urban
Our study	479(95.8%)	22(4.2%)
V Koulapur V <i>et al.</i>	163(77.6%)	47(22.44%)
Mohammad Shafiqul Bari <i>et al.</i>	1300(29.3%)	2455(55.5%)

Out of 500 patients, 479 (95.8%) patients were from rural areas and 21 (4.2%) were from urban areas (Table-17), showing that incidence of poisoning is more in rural areas. Similar to this study, V. Koulapur V *et al.* study in Karnataka showed rural predominance whereas Mohammad Shafiqul Bari *et al.* study in Bangladesh had showed urban predominance.

Table 18: Comparing Marital Status of the Study Patients

Study name	Married	Unmarried
Our study	390(78%)	110(22%)
V. Koulapur V <i>et al.</i>	147(70.2%)	54(25.6%)
Singh B <i>et al.</i>	108(60%)	72(40%)
B. Maharani <i>et al.</i>	101(67.33%)	49(32.66%)

In the study, married patients are in higher number 390(78%) than unmarried 110(22%). Similar to this study, study conducted by V. Koulapur V *et al.* and Wim van der Hoek *et al.* in srilanka, Singh B *et al.* in Ranchi, B. Maharani *et al.* also had higher proportion of married patients.

Table 19: Comparing type of Poison Consumed with other Studies

Study Name	Poison Compound
Our study	Insecticide (69%)
Hettiarachchi J <i>et al.</i>	Paraquat (38.1%)
Deepak Gyenwali <i>et al.</i>	Pesticide OPC (39.6%)
Kondle Raghu <i>et al.</i>	Pesticide (30.73%)

Among the poisoning agents the most common compound involved in this study is insecticide (69%)^[7]. Hettiarachchi J *et al.* study done at Srilanka had Paraquat as common poisoning agent^[8]. Sharminder Kaur *et al.*^[12] study had agriculture pesticide (organophosphorus) as most common. Kondle Raghu *et al.*^[14] study also showed pesticide as most common poisoning agent.

Table 20: Comparing Mean Duration of Hospital Stay

Study name	Mean duration
Our study	4-5 days
Krishna Kumar Agrawal <i>et al.</i>	6-7 days
Deepak Gyenwali <i>et al.</i>	<= 3 days
Shah <i>et al.</i>	5 days
S. Sande <i>et al.</i>	4 days

Out of 500 patients, 293 (58.6%) had 4 to 5 days of hospital stay in this study (Table 20). Krishna Kumar Agrawal *et al.* study showed that 499 patients had mean hospital stay as 6.7 days. Deepak Gyenwali *et al.* study had total days of hospital stay for most of the patients as ≤3 days^[11]. The median hospital stay was 5.39 days and 4 days per patient in study done by Shah *et al.* and S. Sande *et al.* respectively.

Among 500 Patients, 234 had emesis as their symptom accounts for 46.8% in this study. Similar to this study, Mullai Vasanthan *et al.* study also had vomiting as most common presenting feature^[9]. Yusuf Yurumez *et al.*^[13] study and Khaled A. Abdel Baseer had miosis as the most significant presentation.

In the present study we found that around 434 patients (86.8%) who committed suicide had adjustment disorder, followed by alcohol dependence syndrome in 27 patients (5.4%).

In our study, out of 500 patients 471(94.2%) were cured and 15patients (3.0%) died (Table 14). A study by Nilamadhab Kar *et al.*^[15] found a mortality of 26% in patients with suicidal organophosphorus poisoning. Low mortality rate owes to the fact that most cases of poisoning were less severe added to a rapid and proper management of the patients.

Conclusion

This study has indicated that young married males from rural populations are at a higher risk of pesticides poisoning and the most common poison used being insecticides followed by rodenticides and organ phosphorus compounds. Most of the patients had very mild symptoms and the mortality rate is very low. Pesticide poisoning is increasing in incidence and it is one of the preventable public health problems and includes. Mainly the Patients age group 18-30 years. Due to easy, availability of, pesticides, it is the most preferred method of. Suicide, the main reason being adjustment disorder.

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