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## Original Research Article

## Clinical presentation of various APP cases admitted in S.N.M.C., Agra clinical profiling of acute pesticide poisoning (APP) cases admitted in tertiary care hospital of north India

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## ABSTRACT

Poisoning is a significant health problem around the world. In India being an agriculture based economy, Pesticide Poisoning contributes largest sum in poisoning cases. The study was conducted in Emergency Department of S.N. Medical College and Hospital, Agra from Sept 2018 to Sept 2019 to investigate Acute Pesticide Poisoning (APP) cases in the region. Majority of cases in our study were from age group of 21-30 yrs with mean age of  $28.10 \pm 11.38$  yrs with male predominance. In This study we found out that APP is 61% of all poisoning cases, out of them maximum cases belongs to OP poisoning which clinically presented with Dyspnea/Tachypnea, Sweating, Vomiting, Abdominal pain. Mortality in APP cases was found to be 10.5%. Although case fatality ratio is highest in cases of celphos (AIP) which most commonly presented with symptoms of Paresthesias, Diarrhea, and Abdominal pain.

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## 1. Introduction

Poisoning is a significant global public health problem. Everyday around the world, almost 700 people die from poisonings and for every person that dies, several thousands more are affected by poisoning.<sup>1,2</sup> Poisoning is the fourth most common cause of death in India.<sup>3</sup> It has been estimated that, in India five to six persons per lakh of population die due to acute poisoning every year.<sup>4</sup> Nearly a million people die each year as a result of suicide, and chemicals account for a significant number of these deaths. For example, it is estimated that deliberate ingestion of pesticides causes 370,000 deaths each year. The number of these deaths can be reduced by limiting the availability of, and access to, highly toxic pesticides.<sup>5</sup> The yearly worldwide prevalence of APP has been estimated at about

1,000,000 unintentional and 2,000,000 intentional cases, with approximately 220,000 deaths per year.<sup>6,7</sup> Over the last few decades agricultural pesticides have become a common household item in rural areas of the developing world. Due to their easy availability, pesticides have also become commonly used for intentional self-poisoning.<sup>8,9</sup>

Pesticide poisoning is a significant problem in India. Organophosphorus (OP) compounds cause most self-poisoning deaths in southern and central India.<sup>10,11</sup> In parts of northern India, aluminum phosphide causes most deaths in an epidemic that started two decades ago.<sup>11,12</sup> This trend of pesticide poisoning is kept on changing as government changes his policies regarding availability of pesticides according to WHO recommendation on various pesticides based on their hazard to human being and to animals. Recent example is banning of 27 pesticides including like Monocrotophos which has been classified by WHO as highly hazardous list.<sup>13,14</sup> These policy changes lead to

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availability of different pesticides in market which has direct impact on pattern of APP in the country. In this study an attempt has been made there undertaken in the view to gain, further knowledge and insight into Trend of poisoning in S.N. Medical College, Agra

## 2. Material and Methods

The study was conducted in Emergency Department of S.N. Medical College and Hospital, Agra from Sept 2018 to Sept 2019, which is oldest Tertiary care centre of North India. All patients who presented to emergency department with history of poisoning of known substance are taken as study subjects. All pesticide compound poisoning cases admitted in EMERGENCY department of S. N. Medical College & Hospital, Agra are observed. Cases are included Case definition matrix for acute pesticide poisoning as mentioned by Thundiyl et al. (2008 bulletin of WHO) (15) In this study we excluded patients by applying exclusion criteria of brought dead, LAMA, referred to Hospital after partial treatment, referred to Higher Centre.

A detailed history, clinical examination and relevant biochemical investigation needed to be performed, which will be done during initial resuscitation and treatment of patient. Severity of Condition of patient is recorded from bed head tickets (Case sheet). All data is documented and transcribed into a database created using Microsoft Excel. The statistical data collected will be presented in tabular forms, percentages & proportions, bar diagrams & pie charts and analyzed by using SPSS software.

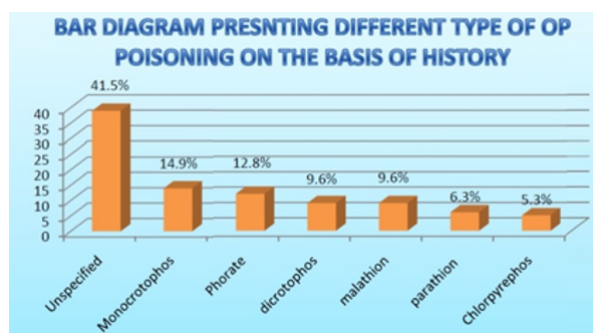


Fig. 1: Different type of OP poisoning on the basis history

### 2.1. Observation and results

During this study total 24780 patients admitted in Emergency department, SNMC, Agra. out of which 626 patients admitted with history of poisoning, among which 382 cases(61%) gave history of acute pesticide poisoning(APP) followed by corrosive (11%), alcohol (9%) with other type. Out of Total 382 patients of APP 258 patients were selected for this study by applying inclusion and exclusion criteria. In our study majority of patients (41%) was in the age group of 21-30 yrs, followed by age

group of 11-20yrs (27%). Mean age of patients is  $28.10 \pm 11.38$  yrs with minimum age of 4 yr and maximum age of 75 yrs. Out of 258 APP cases predominantly cases were male 159(62%) and only 99 (38%) were female. Male to Female ratio of study is 1.6: 1. Route of administration of 95% (221) cases is oral followed by dermatological (5%, 37).<sup>15</sup>

In this study we found out that only 10(3.9%) cases were admitted in emergency with very poor (GCS 7-3) condition, while most of cases (147, 57%) were admitted with poor (GCS 14-7) condition. In our study very few cases arrived within 2 hrs from exposure poison, most of cases (168, 65.1%) were arrived to the hospital in 2-6 hrs of exposure while 72 (27.9%) cases arrived to hospital after 6 hrs. In our study we found out that most of cases admitted were discharged 231 (89.5%) while only few patients 27(10.5%) were deceased during treatment (Table 1).

While on the basis of case definition of APP, maximum no. of APP cases belong to OP poisoning (36.4 %) followed by Celphos (14.7%), Rat poisons(11.2%), OC (8.1%) & Pyrethrenoids (8.1%) while 11.2% cases belong to other pesticide poison(Table-2). In our study on the basis of history of specific poisoning compound out of total 94 OP cases 39(41%) cases have no specific history of particular compound while maximum positive history (15%) is present for monocrotophos followed by phorate (13%), Malathion (10%), dicrotophos (10%) & other compounds (Figure 1).

On differential clinical profiling of different poisoning cases in this study we found out that overall in APP cases most common presenting signs and symptoms of admitted patients are Abdominal pain, Vomiting, Dyspnea/Tachypnea, Diarrhea followed by Sweating, Salivation, Paresthesias, Tremors, Salivation, Lacrymation, Convulsion, Miosis and others as mentioned in (Table ??). While in organophosphate poisoning most common sign and symptoms are Dyspnea/Tachypnea, Sweating, Vomiting, Abdominal pain followed by Lacrymation, Headache etc (Table ??). In Aluminum phosphide (celphos) poisoning common sign and symptoms are Paresthesias, Diarrhea, Abdominal pain followed by jaundice, shock, tremors etc (Table ??).

In our study case fatality ratio of overall APP cases is found to be 10.2. Amongst all pesticide compounds Aluminum phosphide (celphos) poisoning have highest(31.6) case fatality ratio followed by rat poisons, organophosphate, organochlorine and others. Although no death is observed in cases of poisoning with pyrethrenoids, herbicides, fungicides & carbamate compounds (Table 2).

## 3. Discussion

In our study majority of patients (41%) was in the age group of 21-30 yrs which is similar to studies of APP in study of Tangiisuran et al (33.5%), Kamaruzaman et al (25.5%) and Rao et al while in similar studies of wang et al have majority of population of 36-60 yrs (47.9%).<sup>16-19</sup> This study revealed

**Table 1:** Outcome in cases of APP

Outcome	Discharge	Death
No. of cases of APP	231	27
Percentage	89.5%	10.5%

**Table 2:** Various pesticide

Types of Pesticide	No. of APP Cases	Percentage of total APP cases	Total no. of deaths	Case fatality ratio
Organophosphate (OP)	94	36.4%	8	8.5%
Unspecified OP	39		3	7.6%
Monocrotophos	14		1	7.1%
Phorate	12		2	16.6%
Dicrotophos	9		1	11.1%
Malathion	9		1	11.1%
Parathion	6		0	0
Chlorpyrephos	5		0	0
Alumunium phosphide (celphos)	38	14.7%	12	31.6%
Rat poisons	29	11.2%	5	17.2%
Zinc (other metal) phosphide {rat poison}	18	6.9%	5	27.7%
Other rat poisons	11	4.3	0	0
Organochlorides (oc)	21	8.1%	1	4.8%
Unspecified oc	9		1	11.1%
Dichloriphos	4		0	0
Chlorpyrephos	2		0	0
Endrin	3		0	0
Dieldrin	1		0	0
Pyrethrenoids	21	8.1%	0	0
Herbicides	13	5%	0	0
Fungicides	8	3.1%	0	0
Carbamates	5	1.9%	0	0
Others (unspecified pesticide )	29	11.2	1	3.4%
Total	258		27	10.2%

male predominance (62%). The male to female ratio in this study is 1.6:1 while in studies of Rao et al., Wang et al., Tangiisuran et al., Ncube et al. & Kamaruzaman et al. 1.3:1, 0.8:1, 1.13 : 1, 6.6 : 1 & 1.3 : 1 respectively. This variation in these studies is due to difference in population involved in work related to pesticides.<sup>16–20</sup>

In present study majority of APP cases (95%) are from oral route of administration similar to Kamaruzaman et al. Although in Kamaruzaman et al. 4.1% cases of inhalational APP was found while in present study, no such cases are seen.<sup>17</sup> In present study most of APP cases (36.4%) are of OP, which is similar to the studies of Rao et al. (63%) and wang et al. (60.2%) while studies of Kamaruzaman et al. shown prevalence of herbicides (43.6%). This is seen because of different requirements of pesticides in different regions.<sup>17–19</sup> In present study out of OP poisoning cases most common pesticide used was monocrotophos(14.9%) (Table 2) similar to study of Rao et al (39.4%) while in study of Wang et al. majority of OP case was of Methamidophos(36%).<sup>18</sup>

In present Study, most common signs and symptoms seen in APP cases were Abdominal pain (71.3%), vomiting (62.8%) followed by Smell specific to poisonous compound (55.4%), Excessive Salivation (33.7%), Lacrymation, Numbness, Nausea etc, which are similar to studies of Ncube et al and other studies.<sup>20</sup> In this study we found out that organophosphate poisoning most commonly represented with sign and symptoms of Dyspnea/Tachypnea (93.6%) followed by Vomiting, Abdominal Pain, Salivation while in study of Aroor et al most common presenting symptoms were vomiting (76.7%) followed by abdominal pain, sweating, salivation & Dyspnea/Tachypnea.<sup>21</sup> Presenting symptoms in our study were almost similar to the study but variation seen in both studies is due to different level of exposure in both studies. While in study of Islam et al. in Bangladesh most commonly involved clinical manifestations were Gastrointestinal (91%), Pupillary (90%), Glandular (78%), Respiratory (75%) followed by Central nervous system, Cardiovascular system & Urinary.<sup>22,23</sup> Most of the cases (65.1%) arrived to the



hospital in period of 2-6hrs after time of exposure. Most of poisoning cases (57%) admitted with poor general condition (GCS14-7) at time of admission. After treatment of patient most of the cases (89.5%) were discharged after treatment.

In present study case fatality ratio is found to be 10.5 while in study of Rao et al it was much higher (22.6) and in study of Wang et al is much lower (5.5). In our study we found out that although maximum cases of APP belongs to the OP poisoning but case fatality ratio of AIP poisoning (31.6) and ZnP (27.7) is much higher than OP poisoning cases, which make these compound more dangerous in case of poisoning. AIP cases mortality ratio in study of mathai et al is found to be 59.3% which was higher than our study. Clinical presentation in study is almost similar. These variations in the study are probably due to variation of population type, severity of admitted cases, variety of pesticide exposure and numerous other factors.

#### 4. Conclusion

In our study maximum number of patients was between age of 21-30 yrs with male predominance with commonest manner of poisoning being oral ingestion. As this group is bread earner of their families, we are losing young work force due to easy accessibility of these poisons to general population. Although organophosphate the biggest culprit of all APP, aluminum phosphide (celphos) and other metal phosphides were also have big role in APP cases due to easy accessibility as well it is most fatal APP. Death tolls (mortality) from APP is around 10% but it may not be giving the true picture as most of the incidence happens in rural area, where accessibility to tertiary care centers immediately is minimum and some cases may not survive during referral or many cases mild poisoning cases were treated in lower health care centers.

To prevent such high incidences, exposure and death due to poisoning from APP, we should make sure that laws should be made and implemented for Sales of pesticide compounds to general public. Persons using pesticide must be educated for harmful effects of pesticide and should be educated for prophylaxis for APP incidences. Population using pesticides must be counsel for use of personal protective equipment (PPE) to prevent occupational poisoning. Facility of prompt and necessary treatment for APP poisoning should be available to larger population and facilities like tertiary care should be readily available to the affected population.

#### 5. Source of Funding


None.

#### 6. Conflict of Interest

None.

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