

PROFILE OF FATAL PESTICIDE POISONING CASES AT GOVERNMENT MEDICAL COLLEGE, MIRAJ, MAHARASHTRA DURING 2001-2008

* Dr. Vaibhav Sonar

Abstract :

Pesticide poisoning is a major public health problem in developing countries; its usage has increased in recent past and thus increased even its misuse to commit suicide. This retrospective study was carried out at Dept of Forensic Medicine, Govt. Medical College, Miraj, Maharashtra, with the fatal pesticide poisoning cases from 2001 to 2008. During the study period a total 3757 medico legal autopsies were conducted, amongst them poisoning cases constitutes 383 (10.19 %) cases. Out of these 383 poisoning cases 320 cases were due to fatal pesticide poisoning (83.55 % of poisoning cases). All collected data was analyzed in all possible aspects, to identify risk factors, most common offending agent, etc.

Key Words: Pesticide Poisoning, Suicide, Medico legal autopsies, organophosphates, organochlorines, carbamate

Introduction:

Pesticides are compounds that are used to kill pests which may be insects, rodents, fungi, nematodes, mites, ticks, molluscs, and unwanted weeds or herbs. They are used in most of the countries around the world to protect agriculture and horticulture crops against, damage; they are also used as domestic insecticides¹. Acute poisoning by pesticides is becoming a serious global problem. Pesticide poisoning account for

an estimated three million cases of severe poisoning worldwide in each year, with approximately 200,000 deaths. More than 90 % of these cases are reported from developing countries, such as India^{2,3}. It is developing a level which can be called a "Social Calamity"⁴.

Study from UK report 1% pesticide poisoning deaths, South Africa reports 9.7%³, Morocco 4.2%¹, 66 % in Iran³, while various studies from India show figures up to 70%^{4,5,6,7,8,9,10}. Although the poisoning deaths and deaths in road traffic accidents are very nearly the same, great public concern is given to road traffic accidents only, thus poisoning deaths being neglected. Therefore, an alarm for early diagnosis, treatment and prevention so also research needs to follow. Reporting of data is crucial in reducing the burden of pesticide poisoning in any country. As complete knowledge about the nature and magnitude of problem in particular area is essential for doctors in hospital practice¹⁰.

The aim of his study was to determine the epidemiological profile of fatal pesticide poisoning in and around Miraj, as this part of Maharashtra has large agriculture area and patients other than locals come from Karnataka (bordering areas) to Miraj for treatment.

Methods:

This retrospective study was carried out at Dept of Forensic Medicine, Govt. Medical College, Miraj, Maharashtra. We examined all available files of inquest papers, autopsy reports,

Corresponding author :

Dr Vaibhav Sonar, Lecturer and Head

Dept. of Forensic Medicine, Govt. Medical College & Hospital

Miraj, Dist Sangli, Maharashtra. 416410.

E-mail: sonufm76@gmail.com

histopathological examination reports, case papers and toxicological analysis into the fatal pesticide poisoning cases from 2001 to 2008.

We used standard proforma to obtain data from the records to ensure consistency for the whole sample. Information collected includes age, sex, type of institution, place of death, medical attention received, cause and manner of death, report of chemical analysis. We extracted, if present any other relevant information, such as history of psychiatric illness, drug or substance abuse. All collected data was analyzed.

Results:

The present study reveals that out of total 3757 medico legal autopsies conducted, poisoning cases constitutes 383 (10.19 %) cases. Out of these 383 poisoning cases 320 cases were due to fatal pesticide poisoning (83.55 % of poisoning cases). The percentage of pesticide poisoning deaths ranges 9% to 10.4%. (Table 1)

Young adults belonging to age group 21-30 constitutes the majority 122 (38.12%) of victims followed by 31-40 (69, 21.56%), 11-20 (49, 15.31%), 41-50 (42, 13.12%), 51-60 (18, 5.62%), 61-70(13, 4.06%), 71-80(6, 1.87%) was observed. Below ten years of age only one case was found. (Figure 1) Significant decrease in the higher age groups observed. Males outnumbered females, the male female ratio being 2.7:1. (Table 2) The only case found in the age group below ten years is 10 month old female baby who was given pesticide by her mother, constituting dyadic death. Maximum age observed was 80 years.

259 (81.56%) victims were from rural area while 61(18.44%) were from urban area. (Table 3) Out of 320 total pesticide poisoning cases, 230 (71.87%) were married, 88 (27.5%) unmarried and only two (0.63%) widowers. (Table 4)

History recorded at the time of admission and police inquest revealed that 311 (97.18%) cases

were of suicidal in nature followed by occupational exposure resulting in accidental 8 (2.5%). Only one case (0.32%) of homicidal pesticide poisoning was observed. (Table 5) Survival period after admission in hospital were shown in table 6. Different causes for deliberate consumption constitutes family quarrel, failures, and financial problems, disease conditions like AIDS in 6 cases, mental illness and alcoholism.

Results of chemical analysis were shown in Table 7. Endosulfan, Dimtheoate, Dichlorovus consists of maximum in number. In this part chemical analysis is done at Regional Forensic Science Laboratory, Pune while the cases which were from Karnataka region to Forensic Science Laboratory, Banglore. Report of chemical analyzer was negative in more than 4 days of hospitalization. Drawback in this study was that in 157 cases chemical analysis was negative. So nature of offended pesticide on chemical analysis was not possible to determine in these cases.

Discussion:

Committing suicide is one of the oldest way of sacrificing their life by consuming different poisonous substances which are easily accessible to them compared to hanging or other methods. The morbidity, mortality in any case of acute poisoning depends upon number of factors such as nature of poison dose consumed, level of available medical facilities and time interval between intake of poison and medical attention⁷. In this study out of total 3757 medico legal autopsies 383 cases were of fatal poisoning in which 320 cases were due to pesticide consumption. History and police inquest revealed that 311 (97.18%) cases were of suicidal in nature followed by accidental 8 (2.5%). Only one case (0.32%) of homicidal pesticide poisoning was observed. Pesticide poisoning is significant in number as they are preferred in

most of the suicides because of their rapid action, ready availability and knowledge of lethal potency. Homicidal pesticide poisoning is rare owing to disagreeable odour and taste. In this study one case comprises of homicidal pesticide poisoning in a 10 month old baby due to Endosulfan, perpetrator in this case was mother who also committed suicide by consumption of Endosulfan, in the year 2002 thus forming a rare phenomenon of dyadic death using pesticide. In dyadic death or homicide suicide death after committing homicide perpetrator commits suicide. Cause in this case was family quarrel.

Maximum number of cases were found in the young adults of age group 21-30 is consistent with other studies^{1,3,5,6,7,8,9,10,11,12}. The reasons for this trend may be that young adults are more susceptible to frustrations caused by highly competitive society, failures in exams, love affairs, scolding by parents, inability to live with unfulfilled expectations etc.

The sex incidence affected with fatal pesticide poisoning was more with male which outnumbered females the ratio being 2.7:1 and tallies with other studies^{1,3,5,6,7,8,9,10,11,12,13}. Males outnumbered the female as male are often exposed to stress and strain of day to day life, occupational hazards, and easy availability of pesticides. Female cases were due to dowry demands, family quarrels and failures. Three cases were associated with pregnancy out of which one was of unmarried girl.

It was observed in the present study 259 (81.56%) cases were from rural area and 61 (18.44%) cases were from urban area. The maximum pesticide poisoning in rural area may be due to illiteracy, large family size, ignorance, complete dependence on the fate of their crop both in the field and market⁷. As well as easy availability of pesticide compounds. Out of 320 total pesticide poisoning cases, 230 (71.87%) were married, 88 (27.5%) unmarried and only

two (0.63%) widowers. Early marriages in rural community, social customs, limited resources, poverty may lead to married male to consume pesticides than unmarried population. This finding is also consistent with previous studies^{5,6,7,8,9,10,11,12}.

Chemical analysis revealed Endosulfan (41), Dimethoate (33), Diachlorovus (32) outnumbering offending agents. This trend however varies with the area concerned and easy availability. The studies carried out in Chennai, Pune, and Mumbai showed Tik 20 (Diazinon), study in Aurangabad revealed Monocil, thimate, Endosulfan, and Dimethoate in decreasing frequency. In Sri Lanka, dimethoate, Methamidophos, Malthion, Monocrotophos and Fenthion were reported. (as quoted in Manish Nigam et al) In 157 cases chemical analyzers reports were negative. It was observed that generally after four days of hospitalization chemical analysis was negative. This finding is consistent with Manoj Mohanty et al. This may be due to the poison being completely metabolized to by products that is no longer demonstrable during analysis when the person survives for more period.

In the present study 62 cases were brought dead. This finding is consistent with B D Gupta and P C Vaghela. Most of the victims found dead at their farms. This may be due to distance between place of incidence and hospitals, strong desire to commit suicide, improper referral from Primary Health Centers without treatment giving reason of inadequate antidotes and facilities, lack of awareness.

Conclusions:

1. Out of total 3757 medico legal autopsies conducted, poisoning cases constitutes 383 (10.19 %) cases. Out of these 383 poisoning cases 320 cases were due to fatal pesticide

poisoning (83.55 % of poisoning cases).

2. Pesticides were used maximum to commit suicide, consisting 311 (97.18%) victims.
3. Male outnumbered female with male female ratio being 2.7:1, the highest incidence being in the age group of 21-30 years.
4. Most victims were from rural area, married population outnumbering the unmarried.
5. Considering the chemical analysis most common offending agents found were, Endosulfan (41), Dimethoate (33), Diachlorovus (32). In 157 cases chemical analyzers reports were negative. Usually after 4 days of survival chemical analyzers report was negative.

Pesticide poisoning is a major public health problem in developing countries; its usage has increased in recent past and thus increased misuse to commit suicide. So it is important to strengthen the preventive measures by educating people through education programmes, promoting poison information centers, establishing toxicological units in the hospitals and upgrading the peripheral health services and research needs to follow for the reported data.

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Table 1: Annual poisoning deaths, pesticide poisoning deaths in comparison with total unnatural deaths:

Year	Annual autopsies	Poisoning cases	% of poisoning.	Pesticide poisoning	% of pesticide out of poisoning (% total autopsies)
2001	517	60	11.60	48	80 (9.28)
2002	462	51	11.03	45	88.23(9.74)
2003	498	34	6.82	32	94.11(6.42)
2004	453	48	10.59	33	68.75(7.28)
2005	419	46	10.97	41	89.13(9.78)
2006	423	40	9.45	27	67.5(6.38)
2007	485	47	9.69	42	89.36(8.66)
2008	500	57	11.4	52	91.22(10.4)
Total	3757	383	10.19	320	83.55(8.51)

Table 2: Age and gender distribution of fatal pesticide poisoning

Age Group	Total	%	Male	%	Female	%
0-10	01	0.31	00	00	01 *	1.62
11-20	49	15.31	26	11.20	23	38.33
21-30	122	38.12	83	35.77	39	45.34
31-40	69	21.56	54	23.27	15	17.44
41-50	42	13.12	38	16.37	04	4.65
51-60	18	5.62	16	6.89	02	2.32
61-70	13	4.06	09	3.87	02	2.32
71-80	06	1.87	06	2.58	00	00
Total	320	100	232	100	86	100

Table 3: Residence

Year	Total	Rural	%	Urban	%
2001	48	39	81.25	09	18.75
2002	45	34	75.56	11	24.44
2003	32	28	87.5	04	12.5
2004	33	27	81.81	06	18.19
2005	41	30	73.17	11	26.83
2006	27	22	81.48	05	18.52
2007	42	35	83.33	07	16.67
2008	52	44	84.62	08	15.38
Total	320	259	81.56	61	18.44

Table 4: Marital status

Year	Pesticide	Married	%	Unmarried	%	Widwer	%
2001	48	34	70.83	14	29.17	00	00
2002	45	34	75.56	11	24.44	00	00
2003	32	22	68.75	08	25	02	6.25
2004	33	20	60.60	13	39.40	00	00
2005	41	32	78.04	09	21.96	00	00
2006	27	19	70.37	08	29.63	00	00
2007	42	32	76.19	10	23.81	00	00
2008	52	37	71.16	15	28.84	00	00
Total	320	230	71.87	88	27.5	02	0.63

Table 5: Manner of death:

Year	Suicide	Accident	Homicide
2001	48	00	00
2002	43	01	01
2003	31	01	00
2004	33	00	00
2005	40	01	00
2006	26	01	00
2007	39	03	00
2008	51	01	00
Total	311	08	01

Table 6: Survival time after hospitalization

Survival	No of cases	%
Brought dead	62	19.37
0-12 hrs	59	18.43
12-24 hrs	06	1.87
24-48 hrs	58	18.12
48-72 hrs	34	10.62
72- 96 hrs	17	5.31
96-120 hrs	26	8.12
> 5 days	58	18.12
Total	320	100

Table 7: Results of chemical analysis

Pesticide	Total no.	%
Dimethoate	33	10.31
Dichlorovus	32	10
Monocrotophos	15	4.68
Quinolpos	06	1.87
Chlorpyriphos	04	1.25
Propenophos	01	0.31
Triazophos	01	0.31
Endosulfan	41	12.81
Malthion	02	0.62
Carbamate	06	1.87
Paraquate	03	0.93
*Organophosphates	08	2.5
*Oraganochlorines	11	3.43
Nil	157	49.06
Total	320	100

* In some chemical analyzer's reports, only organophosphates or organochlorine was mentioned.