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Profile of Agricultural Pesticide Compound Suicidal Poisoning Deaths: An Autopsy Based Study

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ABSTRACT

Pesticide suicide is a major health problem globally. Every year, more than 800000 people die from suicides of which an estimated 20% are from pesticide ingestion. This autopsy based study aimed to document the agricultural pesticide compound suicidal poisoning deaths in the study region. To know the profile of agricultural pesticide compound suicidal poisoning deaths in relation to the burden, distribution in connection with different age-groups, sex, season, marital status and pesticide type. The present autopsy based study was carried out in the Department of Forensic Medicine and Toxicology, Government Medical College, Aurangabad, Maharashtra, India. In the year 2021, total 2554 medico-legal autopsies were conducted by the department of which 244 cases suggestive of the agricultural pesticide compound suicidal poisoning were selected for further study according to the objectives of this study. Burden of agricultural pesticide compound suicidal poisoning death cases was 9.55% (244/2554) out of total medico-legal autopsies conducted during year 2021. More than half number of cases i.e. 50.81% observed between 21-40 years of age group with highest percentage of cases found in the 21-30 years of age group. Males were greatly outnumbered the females with Male Female ratio was 2.69:1. Maximum number of cases i.e. 68.03% belonged to rural area and 40.16% observed during rainy season. Highest numbers of cases i.e. 80.33% were married with married to unmarried cases ratio was 4.08:1. Highest number of cases i.e. 65.98% suggested insecticidal compound suicidal poisoning deaths. Suicidal deaths due to agricultural pesticide compound poisoning is very serious concern in India and also worldwide. It not only affects the family but also the workforce of the nation. In addition to Rules and Regulations proper preventive measures and use of alternative non-hazardous bio-pesticides are also necessary to overcome such serious health challenges.

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Key Words
Pesticide, suicidal, poisoning, deaths, autopsy

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INTRODUCTION

Globally more than half of the pesticides are utilized in Asia. India stands 12th in pesticide use globally and 3rd in Asia after China and Turkey. Pesticide production in India began in 1952 with the development of a facility for the manufacturing of BHC in Calcutta and India is today Asia's second largest maker of pesticides after China, ranking 12th internationally. Pesticides and Fertilizers are the integral part of modern agriculture[1]. India being the 2nd most populated country in the world and having agricultural based economy, there is easy availability of pesticides and fertilizers compounds to the general population. Pesticides are compounds that are used to kill or repel pests which may be insects, rodents, fungi, nematodes, mites, ticks, mollusks and unwanted weeds or herbs. Pesticides are classified as Insecticides, Rodenticides, Herbicides (Weedicides), Fungicides, Nematicides, Acaricides, Molluscicides and Fumigants. [2]Pesticide suicide is a major health problem globally. Every year, more than 800000 people die from suicides of which an estimated 20% are from pesticide ingestion[3]. Pesticide poisoning is responsible for overwhelming morbidity and mortality worldwide, especially in developing countries where these products are massively used in agriculture. Thus, it is recognized as an important public health problem around the world[4]. The National Crime Records Bureau (NCRB) released data on suicidal deaths in India in August, 2022 and the figures were startling. A total of 1,64,033 suicides were reported in the country in 2021[5]. As per NCRB, in India poisoning is the 2nd most common means/mode adopted by the victims to commit suicide during 2020-21.Many studies carried out worldwide in relation to pesticide poisoning. However, there are few studies reporting pesticide poisoning related deaths in the region where present study was carried out. Hence this study aimed to document the agricultural pesticide compound suicidal poisoning deaths from the Forensic Medicine and Toxicology Department, Government Medical College, Aurangabad, Maharashtra, India. The objective of this study was to know the profile of agricultural pesticide compound suicidal poisoning deaths in relation to the burden, distribution in connection with different age-groups, sex, season, marital status and pesticide type.

MATERIAL and METHODS

The present autopsy based study was carried out in the Department of Forensic Medicine and Toxicology, Government Medical College, Aurangabad, Maharashtra, India.During period from 1st January to 31st December of the year 2021, Total 2554 medico-legal autopsies were conducted by the department of which 244 (9.55%) cases were selected after obtaining history from the relatives/person(s) having information/police personnel present at the time of medico-legal autopsy and information/findings from clinical papers/police inquest papers/medico-legal autopsy examination reports/forensic science laboratory reports/final opinions about cause of death whichever suggested agricultural pesticide suicidal poisoning and further studied to know the profile of agricultural pesticide compound suicidal poisoning death cases in relation to the burden (incidence), distribution of cases in connection with different age-groups, sex, season, marital status and pesticide type. The data is then appropriately analyzed and tabulated using various parameters.

OBSERVATION AND RESULTS

During period from 1st January to 31st December of the year 2021, Total 2554 Medico-Legal Autopsies were conducted by the department of which 244 cases of agricultural pesticide compound suicidal poisoning death cases were selected. Burden of these cases was 9.55% (244/2554) out of total Medico-Legal Autopsies.

In the present study (Table No. 1) out of total 244 cases, more than half number of cases i.e. 124 (50.81%) observed between 21-40 years of age group with highest percentage of cases i.e. 28.28% found in the 21-30 years of age group followed by 22.54% and 17.62% in the 31-40 years and 51-60 years age groups respectively. 13.93% of cases were from the below 20 years of age.

In the present study (Table No. 2) Male predominance was observed with 72.95% (178) male and 27.05% (66) female cases out of total 244 cases. Males were greatly outnumbered the females with Male Female ratio was 2.69:1. Out of the total 244 cases, maximum number of cases i.e. 166 (68.03%) belonged to rural area and 78 (31.97%) cases belonged to urban area of residence. In this study (Table No. 3) out of the total 244 cases, maximum cases i.e. 98 (40.16%) observed during rainy season followed by 81 (33.2%) cases in the winter season. 65 (26.64%) cases observed in the summer season.

In this study (Table No. 4) out of the total 244 cases, highest number of cases i.e. 196 (80.33%) were married and 48 (19.67%) cases were unmarried with Married to Unmarried cases ratio was 4.08:1. Also, married cases were greatly outnumbered than unmarried cases in the male as well as female sex category.

In the present study (Table No. 5) out of the total 244 cases, highest number of cases i.e. 161 (65.98%) suggested insecticidal compound suicidal poisoning deaths followed by the herbicidal compound i.e. 63 (25.82%) cases, total of which comprised more than 90% (91.8%) of cases. Rest of the pesticide compound suicidal poisoning suggested death cases were less than 10% (i.e. 8.2%).

Table 1: Age Group wise distribution of cases (n = 244)

Age Group (in Years)	No. of Cases	Percentage
Below 20 Years	34	13.93
21-30	69	28.28
31-40	55	22.54
41-50	29	11.89
51-60	43	17.62
61 and Above	14	5.74
Total	244	100

Table 2: Residential area and sex wise distribution of cases (n = 244)

Residence	Male	Female	Total (%)
Urban	25	53	78 (31.97%)
Rural	153	13	166 (68.03%)
Total	178 (72.95%)	66 (27.05%)	244 (100%)

Table 3: Season Wise Distribution of Cases (n = 244)

Season	Total No. of Cases	Percentage
Summer	65	26.64
Rainy	98	40.16
Winter	81	33.2
Total	244	100

Table 4: Marital status and sex wise distribution of cases (n = 244)

Marital Status	Male	Female	Total	Percentage
Married	145	51	196	80.33
Unmarried	33	15	48	19.67
Total	178	66	244	100

Table 5: Type of pesticide and distribution of cases (n = 244)

Type of Pesticide	No. of Cases	Percentage
Insecticides	161	65.98
Herbicides	63	25.82
Rodenticides	15	6.15
Fungicides & Others	05	2.05
Total	244	100

DISCUSSIONS

In the present study, the burden of agricultural pesticide compound suicidal poisoning death cases was 9.55% out of total medico-legal autopsies. This finding is consistent with the percentage of pesticide poisoning deaths ranges 9-10.4% observed by Vaibhav Sonar in his study and Mew *et al*.[6] identified data from 108 countries (102 from WHO data, 6 from literature) and a conservative estimate based on these data indicated them that there were approximately 110,000 pesticide self-poisoning deaths each year from 2010 to 2014, comprising 13.7% of all global suicides. It may be due to easy availability of pesticides in the market.

More than half number of cases i.e. 50.81% observed between 21-40 years of age group with highest percentage of cases found in the 21-30 years of age group which is consistent with study conducted by Mlayeh *et al*.[7] Vaibhav Sonar, Koulapur *et al*.[4,6,8] observed maximum number of cases found in young adults of age group 21-30 and also consistent with the findings published in other similar kind of studies. Buckley *et al*.[9-18] found median age of 29 years in their study[19] It is pertinent to note that, in the present study 13.93% of cases were from the below 20 years of age. It may be due to that young generation is having high expectations, increased materialism, interpersonal relationship issues such as love break ups, marital and family issues, also not coping with failures in exams, life or competitive world.

In connection with cases distribution according to the sex, maximum number of cases i.e. 72.95% observed in males and females were 27.05%. Males were greatly outnumbered the females with Male: Female ratio was 2.69:1. This finding is consistent with observations of many other studies[6,9-18] Male's outnumbered females, probable reason may be due to that in our country as on today also males being predominant bread earner for the family sustaining day to day life pressure in his mind. Indebtedness, economic crisis, lack of jobs, lack of social security, lack of familial, social and mental support, addictions and habits, mental disorder, etc. are probable causes. In connection with female cases, high expectations, increased materialism, interpersonal relationship issues such as love break ups, marital and family issues, also not coping with failures in exams, life or competitive world, lack of jobs, lack of familial, social and mental support, etc. are probable causes.

It was observed that maximum number of cases i.e. 68.03% belonged to rural area. 31.97% cases belonged to urban area of residence. In rural areas main economic source is agriculture. Hence, there is increased use of pesticide compounds in agriculture that can be also misused for the suicide purpose due to the failure of crop, indebtedness, economic crisis, lack of jobs, lack of social security, etc. This may be the probable reason in this regard.

In this study, it was observed that maximum cases i.e. 40.16% observed during rainy season followed by 33.2% cases in the winter season. 26.64% cases were observed in the summer season. The maximum cases during rainy season were observed and probable reason behind this can be that during rainy season there is initiation of cultivation of crops. During this season, there is purchasing of agricultural equipments, pesticides and fertilizers in study region. In study region, there is inadequate rain falls or delayed rain falls which hampers crops growth or destruction of crops due to untimely sudden heavy rain falls which might be major cause of economic crisis in rural areas which leads to suicidal consumption of pesticides. However, exact relationship between cases and seasons cannot be ascertained.

In the present study, highest numbers of cases i.e. 80.33% were married and 19.67% cases were unmarried with married to unmarried cases ratio was 4.08:1. This finding is similar with other studies.[6,11-18] Poverty, illiteracy, large family, interpersonal disputes, unemployment, etc. are probable reasons.

In the present study, highest number of cases i.e. 65.98% suggested insecticidal compound suicidal poisoning deaths followed by the herbicidal compound i.e. 25.82% cases, total of which comprised more than 90% (91.8%) of cases. Rest of the pesticide compound suicidal poisoning suggested death cases were less

than 10% (i.e. 8.2%). So, insecticidal compound consumptions were suggestive to be leading potential cause for near about 2/3rd of cases. In other studies also, out of the pesticide compounds, insecticidal compound suicidal consumption death cases were maximum[4,6,8,19]. In the agriculture, insecticides are maximally used. So, this could be other probable reason behind maximum cases due to insecticidal type of pesticide compounds.

CONCLUSION

Suicidal deaths due to agricultural pesticide compound poisoning is very serious concern in India and also worldwide. It not only affects the family but also the workforce of the nation. In spite of existing Government's strict Rules and Regulations, suicidal deaths due to pesticide compounds are occurring. So, along with implementation of Rules and Regulations proper education, counseling, mental health awareness, preventive measures, timely primary management, up-gradation of existing health services, establishment of poison information centers and use of alternative non-hazardous bio-pesticides are also necessary to overcome such serious health challenges. Present study will help for making policy decisions by the concerned authorities in the larger interest of society and an environment.

REFERENCES

1. Nayak, P. and H. Solanki, 2021. Pesticides and Indian agriculture-a review. Int. J. Res., 9: 250-263.
2. Pillay, V.V., 2023. Textbook of Forensic Medicine and Toxicology. 20Ed Edn., Paras Medical, New Delhi, Pages: 512.
3. Brassell, M., A. Karunarathne, L. Utyasheva, M. Eddleston, F. Konradsen and H.A. Rother, 2022. Current pesticide suicide surveillance methods used across the African continent: A scoping review protocol. BMJ Open, Vol. 12. 10.1136/bmjopen-2021-055923
4. Mlayeh, S., K. Annabi, A.B. Daly, M. Jedidi and M.B. Dhiab, 2020. Pesticide poisoning deaths: A 19-year retrospective study of medicolegal autopsies in center tunisia. Egypt. J. Forensic Sci., Vol. 10. 10.1186/s41935-020-00201-7
5. Singh, O., 2022. Startling suicide statistics in India: Time for urgent action. Indian J. Psychiatry, 64: 431-432.
6. Sonar, V., 2010. Profile of fatal pesticide poisoning cases at Government Medical College, Miraj, Maharashtra during. J. Kar. Med. Leg. Soc., 19: 6-10.
7. Mew, E.J., P. Padmanathan, F. Konradsen, M. Eddleston, S.S. Chang, M.R. Phillips and D. Gunnell, 2017. The global burden of fatal self-poisoning with pesticides 2006-15: Systematic review. J. Affective Disord., 219: 93-104.
8. Koulapur, V.V., S. Pujar, S. Honnungar, S. Jirli and P. Patil, 2015. Epidemiological profile of pesticide poisoning cases in Bijapur, Karnataka in Southwest India: A retrospective study. Int. J. Med. Toxicol. Forensic. Med., 5: 180-1804.
9. Cadi, M.A.E., A. Mezzane, B. Meddah, Y. Khabbal and L. Idrissi, 2008. Fatal pesticides poisoning in Morocco (2000-2005). Ann. Toxicologie Analytique, 20: 73-77.
10. Malangu, N. and G.A. Ogunbanjo, 2009. A profile of acute poisoning at selected hospitals in south Africa. Southern Afr. J. Epidemiol. Infec., 24: 14-16.
11. Moghadamnia, A.A. and M. Abdollahi, 2002. An epidemiological study of poisoning in northern Islamic Republic of Iran. East Mediterr Health J . 8: 88-94.
12. Kapila, P. H.S. Sekhon and V.K. Mishra, 2003. Study of poisoning deaths in and around Shimla (H.P.). IIJFMT., Vol. 1.
13. Kiran, N., R.H.S. Rani, V. Jaiprakash and K, Vanaja, 2008. Pattern of poisoning reported at South Indian tertiary care hospital. IJFMT., 2: 17-19.
14. Shetty, V.B., Gurudatta S. Pawar and P.I. Inamadar, 2008. Profile of poisoning cases in District and Medical College Hospitals of North Karnataka. IJFMT., 2: 26-28.
15. Sharma, B.R., N. Relhan, N. Gupta and H. Singh, 2007. Trends of fatal poisoning in northern India: A ten-year autopsy analysis. J. Pharmacol. Toxicol., 2: 350-358.
16. Dash, S.K., A.S. Raju, M.K. Mohanty, K.K. Patnaik and S. Mohanty, 2005. Sociodemographic profile of poisoning cases. JIAFM., 27: 133-137.
17. Gupta, B.D. and P.C. Vaghela, 2005. Profile of fatal poisoning in and around Jamnagar. JIAFM., 27: 145-148.
18. Mohanty, M.K., P. Sidhartha, M. Arun, R.G. Menezes and V. Palimar, 2005. Profile of fatal poisoning in and around jamnagar. JIAFM., Vol. 1.
19. Buckley, N.A., M. Fahim, J. Raubenheimer, I.B. Gawarammana, M. Eddleston, M.S. Roberts and A.H. Dawson, 2021. Case fatality of agricultural pesticides after self-poisoning in Sri Lanka: A prospective cohort study. Lancet Global Health, 9