Original Article

STUDY OF POISONING TRENDS IN SOUTH INDIA: A PERSPECTIVE IN RELATION TO INDIAN STATISTICS

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ABSTRACT

Poisoning is a major social and economic problem, and public health concern all over the world. Periodic epidemiological studies are essential to recognize the trends of poisoning in each region. This study was conducted to determine the patterns in deaths due to poisoning on cases subjected to postmortem examination in a tertiary care teaching hospital in Telangana, South India. Data including the age and gender distribution, nature of poison and manner of death were considered. Out of 866 post mortem examination done in year 2014, 136 (15.7%) were poisoning. Organophosphorous compound was the most common agent of poisoning (31.62%). The incidence of poisoning was more predominant in males and in 21-30 years age group (43.38%). Suicidal cases were found to be more common than accidental cases.

Keywords: poisoning agent; house hold poisons; pesticides; prevalence

INTRODUCTION

Death resulting from poisoning is a major socio-economic and global public-health issue although its type varies from region to country.[1,2] In 2012, World Health Organization (WHO) data estimated 193,460 deaths worldwide from accidental poisoning. It also indicated that nearly 10,00,000 deaths occur on an average due suicidal poisoning with pesticides contributing 370,000 deaths. 84% of these deaths occurred in low- and middle-income countries.[3] According to National Crime records bureau data, accidental poisoning with 39.1% (26173) mortalities contribute the second more common cause of all accidental deaths in India after road and rail accidents in India, and suicidal poisoning with 27.9% (37,232) mortalities contributes the second most common cause of all suicidal deaths in India in year 2015 after hanging. [4] Due to easy availability and low cost of poison, most individuals prefer it as a common and peaceful method of committing suicide compared to other methods.5-8 Further, people are also exposed to accidental poisoning due to occupational hazards,[9-11] and improper handling and unsafe storage.[12-14] In India, many literatures have reported pesticides as commonly used poisoning agents for suicide, as agriculture being the major profession of the rural population.[15,16] The National data or surveys does not represent the exact incidence of poisoning, which could be far higher, as many are underreported to the centres especially from rural areas and especially accidents from occupational exposure are never reported. So, the rising incidences particularly in this geographical area have prompted us to undertake this study.[15] This study aimed to describe the patterns of death pertaining to the age, gender, marital status, demographic distribution of the cases along with an objective to know the manner and agent causing the death

MATERIALS AND METHODS

The present cross-sectional study was conducted for a period of one year in 2014 on the cases of death due to poisoning, which were subjected to postmortem examination in a tertiary care teaching hospital in Nizamabad, Telangana, South India. Information relevant to various criteria such as age, gender, marital status, demographic area, manner and agent causing the

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death was obtained from the inquest report, post-mortem examination and report of chemical analysis of viscera from forensic science laboratory. All observations were recorded in specially designed proforma for study. Data was then collected and analysed to determine the results.

RESULTS

A total of 866 postmortem examinations were conducted in the year 2014 out of which 136 cases (15.7%) were poisoning. Suicidal deaths were the most common manner of the death (n=120, 88.24%) followed by cases accidental poisoning (n=16, 11.76%), and no homicidal deaths were reported. Maximum number of deaths due to poisoning were noted in males (n=90, 66.18%) compared to females (n=46, 33.82%). The incidence was highest in the age group 21-30 years (n=59, 43.38%), followed by the age group 31-40 years (n=29, 21.32%) and minimum number of cases (n=3, 2.21%) were reported in age group 0-10 years (Table 1).The incidence was more in rural areas (n=97, 71.32%) as compared to the urban (Fig. 2). The distribution was most commonly observed in the married individuals (n=111, 81.62%). (Table 3) Chemical Analysis of the viscera was positive in majority (n=121, 88.97%) of the cases (Fig. 3). Organophosphorous compounds was responsible for majority of deaths (n=43, 31.62%) followed by Zinc Phosphide (n=19, 13.97%). Seven cases (5.15%) of snake bite cases were reported (Table 2).

DISCUSSION

Basic pattern and trend of poisoning shows a regional variation. Deaths as a result of poisoning by various compounds are very frequently being reported in India. This study tried to compare the observations in the present study with various medicolegal studies in India (Table 3). In present study, a total of 866 postmortem examinations were conducted in the year 2014, of which 136 cases (15.7%) were poisoning. The incidence of poisoning is consistent with many studies conducted in other parts of country ranging between 10-20% as shown in Table 3, except for studies by Harish D, Sharma BR,[17] Chavali KH, Sharma A; Shetty AK, Jirli PS, Bastia BK;[18] and Siddapur KR, Pawar GS, Mestri SC,[19] where higher proportion of fatal poisoning was reported (20-30%). Rural background and agriculture setups in most of regions in India predisposes to this higher incidence.[15,16] Suicide was the most common manner of the death (n=120, 88.24%) in this study. Such predominance were also noted by most studies as shown in Table 3, but in contrast the study of Gargi J, Tejpal HR, Chanana A, Rai G, Chaudhary R20 revealed accidental poisoning as the most common manner of death. They are encountered in large number in different region of the country due to the easy accessibility of poison, in addition to immense agricultural practices among rural population. This is further contributed by unfavourable social, economic and other stressful situations.[6,7]

Table 1: Distribution of poisoning cases based on age, gender and manner of death

S. No.	Age group (years)	Suicidal		Accidental		Incidence n (%)
		Male	Female	Male	Female	
1	0-10	0	0	2	1	3 (2.21)
2	11-20	12	6	1	1	20 (14.7)
3	21-30	36	20	2	1	59 (43.38)
4	31-40	19	6	2	2	29 (21.32)
5	41-50	8	3	1	1	13 (9.56)
6	50-60	4	3	0	0	7 (5.15)
7	>60	2	1	1	1	5 (3.68)
	Total Cases (%)	81 (59.56)	39 (28.68)	9 (6.62)	7 (5.14)	7 (5.15)

Table 2: Distribution of cases based on poisoning-agents.

S. No.	Agent of Poisoning	Suicidal
	Pesticide	**91 (66.91)**
1	Organophosphates	43 (31.62)
2	Carbamates	14 (10.29)
3	Organochlorines	10 (7.35)
4	Aluminium Phosphide	5 (3.68)
5	Zinc Phosphide	19 (13.97)
	House hold Products	**24 (17.65)**
6	Sulphuric acid poisoning	2 (1.47)
7	Kerosene	9 (6.62)
8	Nail polish remover	6 (4.41)
9	Paint thinner	7 (5.15)
	Natural	**10 (7.35)**
10	Snake bites	7 (5.15)
11	Unknown plant poison	3 (2.2)
	Others	**11 (8.09)**
12	Arracks (adulterated with Chloral hydrate or diazepam)	11 (8.9)

Majority of deaths due to poisoning were noted in males (n=90, 66.18%). This male predominance was a common feature noted in studies of various authors in different parts of India as shown in Table 3. Whereas the finding of study conducted by Singh K, Oberoi SS, Bhullar DS during 2001-2002 reported female as major group involved (57%) though with a minor variation.21 This male predominance could be explained by their more active involvement in dealing with social and family life, at most times resulting in stressful situations. This study showed that majority of victims (n=59, 43.38%) were between 21-30 years. As indicated in Table 3, similar close convergence was also observed with many other studies in India. These young age victims being in the most active periods of their live are frequently affected. In addition, in commonly males with this age group, there are many reasons for their suffering from failure in career, stress of the modern life style, unemployment, occupational issues, scolding from parents or teachers, love failure, family problems etc. [5-8] The incidence was more in rural areas (n=97, 71.32%). Literature presented also showed similar findings as agriculture is the main occupation in many regions of the country. But studies of Kumar S, Pathak A, Mangal HM;22 and Waghmare S, Mohite S23 reported maximum incidence in urban population. As indicated in most studies, the present study also noted that distribution was most commonly in the married individuals (n=111, 81.62%). The finding could be related to the fact that men were prone to stress due to unemployment, and being bread earner of the family. Chemical Analysis of the viscera was positive in majority (n=121, 88.97%) of the cases. Only few studies reported this observation. It was positive in studies conducted by Varma NM, Kalele SD (86.73%);24 Siddapur KR, Pawar GS, Mestri SC (83.98%);19 and Gargi J, Tejpal HR, Chanana A, Rai G, Chaudhary R (72.28%).[20] Pesticide was responsible for majority of deaths (69.91%), with organophosphorous compound being the most common agent of poisoning (31.62%). We could attribute this to the fact that the study was conducted in a rural area where farming is the main occupation. The use of certain poisons mainly depends on the its availability and accessibility to

Fig. 1: Distribution of poisoning cases based on demographic area

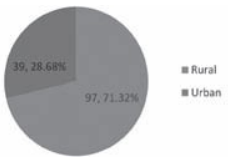

Fig.2: Distribution of poisoning cases based on marital status

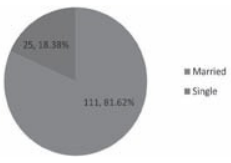

Fig. 3: Distribution of poisoning cases based on chemical analysis report

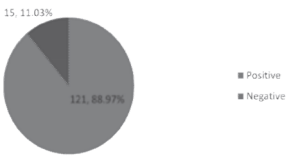

Table 3 – Comparison of various poisoning profiles in India with present study (presenting most common incidences).[32-42]

Author/ Study	Year of study	Area of Study	Incidence of poison	Gender	Age (in years)	Demo-graphic area	Marital status	Manner of death	Agent of poison
Singh K et al.[21]	2001-2002	Patiala, Punjab	-	Female 57%	21-30 57%	Rural 64%	Married 68%	Suicide 69%	Organophosphorus
Jaiprakash H et al.[25]	2003	Kolar, Karnataka	-	Male 62%	21-30 37.3%	-	Married 58%	Suicide 94%	Organophosphorus and chlorines 60%
Kumar TN et al.[26]	2003	Allahabad, Uttar Pradesh	11.7%	Male 66.83%	21-30 41.49%	Rural 61.46%	-	-	Aluminium phosphide 40.49%
Arun M et al.[27]	2003-2004	Manipal, Karnataka	19.4%	Male 73.1%	21-30 30.9%	Rural 63.7%	-	92%	Organophosphorus 65.5%
Gupta BD et al.[28]	2003-2004	Jamnagar, Gujarat	15.98%	Males 62.1%	21-30 43.1%	Rural 62.8%	Married 67.6%	Suicide 68.2%	Organophosphorus 62.24%
Kanchan T et al.[29]	2004	Manipal, Karnataka	17.9% (Suicide)	Male 73.7%	20-29 29.2%	-	-	-	Organophosphorus 75.91%
Gupta S et al.[30]	2004-2005	Surat, Gujarat	9.93%	Male 66.1%	21-30 33.65%	-	Married 74.8%	-	Organophosphorus 28.1%
Sharma DC et al.[31]	2005	Punjab	-	Male 76.4%	21-30 35%	-	-	-	Organochlorines 42.8%
Harish D et al.[17]	1996-2005	Chandigarh, Punjab	24%	Male 65.17%	21-30 45.92%	Rural 59.83%	Married 60.81%	Suicide 93.96%	Aluminium Phosphide 50.42%
Gargi J et al.[20]	2007	Amritsar, Punjab	16%	Male 81.2%	21-30 37.6%	Rural 52.63%	-	Accident 44.4%	Aluminium phosphide 43.60%
Kumar S et al.[22]	2007	Rajkot, Gujarat	10.2%	Male 57.69%	21-30 32.7%	Urban 64.9%	-	Suicide 92.8%	-
Santhosh CS et al.[32]	20xx	Davangere, Karnataka	-	Male 70.19%	21-30 37.74%	Rural 56.23%	-	Suicide 69.43%	Organophosphorus 63.77%
Shetty AK et al.[18]	2004-2008	Belgaum, Karnataka	25%	Male 68.5%	21-30 43%	Rural 76%	40	Suicide 73%	Organophosphorus 47%
Siddapur KR et al.[19]	2007-2008	Davangere, Karnataka	30.1%	Male 69.7%	21-30 30.7%	Rural 58.8	Married 66.2%	Suicide 93.1%	Organophosphorus 69.3%
Kumar TN et al.[32]	2005-2009	Bangalore, Karnataka	11.7%	Male 67.8%	21-30 33.7%	-	Married 61.1%	-	Organophosphorous 33.7%
Varma NM et al.[24]	2008-2009	Bhavnagar, Gujarat	16.29%	Male 65.03%	21-30 30.06%	Rural 58.05%	Married 62.93%	Suicide 72.02%	Organophosphorous 45.06%
Waghmare S et al.[23]	2008-2010	Mumbai, Maharashtra	5.09%	Male 70%	21-30 31.42%	Urban 68.57%	Married 51.42	Suicide 44.28%	Insecticide 31.42%
Singh SP et al.[34]	2010	Patiala, Punjab	17.62	Male 72.72%	21-30 41.82%	Rural 54.55%	-	-	Aluminium phosphide 50.9%
Haloi M et al.[35]	2010-2011	Kamrup, Assam	3.7%	Male 62.5%	20-29 33.3%	Rural 73.95%	Married 66.6%	Suicide 92.7%	Organophosphorus 22.91%
Kumar AH et al.[36]	2009-2013	Varanasi, Uttar Pradesh	8.79%	Male 71.54%	21-30 38.73%	Rural 73.95%	-	Suicide 96.09	-
Bhagora RV et al.[37]	2013	Bhavnagar, Gujarat	12.99%	Male 57.58%	21-30 28.49%	Rural 63.64%	Married	Suicide 52.73%	Insecticide 51.52%
Singh B et al.[38]	2013-2014	Ranchi, Jharkhand	5.2% (suicide)	Male 55%	15-29 55%	-	Married 60%	-	Organophosphorus 50%
Kumar DR et al.[39]	2013-2014	Tumkur, karnataka	-	Male 71.42%	21-30 37.56%	-	-	Suicide 91.53%	Organophosphorus 65.61%
Raut PK et al.[40]	2014	Nagpur, Maharahtra	14.54%	Males 68.05%	21-30 45.71%	Rural 59.72%	Married 60%	-	Insecticide 34.72% (Organophosphorus)
Umesh SR et al.[41]	2013-2015	Gulbarga, Karnataka	-	Male 62%	21-30 64%	Rural 78%	Married 76%	-	Organophosphorus 78%
Patil B et al.[41]	2013-2015	Raichur, Karnataka	-	Male 55%	21-30 25%	-	-	Suicide 75%	Organophosphorus 70%
Present study	2014	Nizamabad, Telangana	15.7%	Male 66.18%	25-36 43.38%	Rural 71.32%	Married 81.62%	Suicidal 88.24%	Organophosphorous 31.62%

an individual.[15,16] As depicted in Table 3, several studies reported similar findings with organophosphorus compounds as agent causing high incidence of fatal poisoning. But the most common agent was found to be Aluminium phosphide in some studies[17,20,24] and organochlorines in one study.[31]

CONCLUSION

The Government must adapt prevention campaigns and health education initiatives for bringing awareness to children, parents and elderly at all levels of the community from schools to health care centres including rural and urban population regarding proper handling and safe storage of poison with reduce the incidence of occupational and accidental poisoning. Counselling of the students and farmers under stressful situations, along with the provision of government incentives and schemes to farmer along with implication of strict measures by banning or enforcing regulations on the sale of such poisons will hinder the cases of suicides. The availability of more poison information centres, toxicology laboratories together with provision of advanced diagnostic and management facilities for poisoning from primary to tertiary health care centres will decrease their morbidity and mortality.

Conflict of Interest:

The authors declare there is no conflict of interests

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