

Changing Trends Inpoisoning at a Tertiary Healthcare Centre in North Karnataka, India

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Abstract

Background: Acute poisoning is a medical emergency as well as a major public health problem as it leads to significant burden on healthcare services. It is pertinent to know the nature and outcome of poisoning for effective prevention and management strategies.

Method: A comparative retrospective analysis of 622 poisoning cases admitted to a tertiary care hospital during the period from 2011-12 and 2018-19 were compared to assess the age, sex, mode of poisoning and the nature of the poisonous substance.

Conclusion: The study reveals a sharp increase in the acute poisoning cases and changing trends of commonly used poisons with passage of time. Although, males outnumbered females, a steep rise in female poisoning cases, with majority (60%) being young adults especially in the age group of 21-30 years is alarming. Suicide was the most common manner of poisoning, while organophosphates and medicinal drugs were the most commonly used substances.

Keywords: Drug overdose; Organophosphates; Pesticides; Poisoning; Prescription drug misuse; Suicide.

Introduction

Poison and poisoning are known to mankind since times immemorial. Mortality and morbidity due to acute poisoning has tremendous medical, legal and social significance. Intentional ingestion of pesticides is estimated to account for one in five of all suicides globally.¹ India, being mainly an agrarian country, with majority of the population belonging to rural areas, has witnessed poisoning due to conventional insecticides like organophosphates. However, in the past few years, with the advent of newer agricultural poisons and easy

availability of pharmacological products to an educated population, remarkable changes have occurred in the trends of acute poisoning. The present day poisoning trends pose a challenge in the diagnosis, treatment and availability of analytical facilities in developing countries.

The changing trends need to be studied on regional basis as knowledge of the general patterns of poisoning in a particular region would help in proper healthcare policy planning, so as to equip the healthcare centres for early diagnosis and effective treatment, which in turn would result in a reduction in morbidity and mortality. The present study was an attempt to analyze the change in the commonly used poisonous substances across two time periods.

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Materials and Method

The present study is a comparative, retrospective chart review across two time periods. All cases of poisoning admitted to SDM College of Medical

Sciences and Hospital, a tertiary healthcare centre at Dharwad, Karnataka from January 2011 to December 2012 and January 2018 to December 2019 were included for the study. Cases due to snake bite envenomation and/or other insect bites were excluded from the study. Socio-demographic details such as age, gender, marital status, occupation, manner of poisoning and type of poisonous substance consumed were collected from the hospital records. Data was tabulated and analysed using descriptive statistics with statistical significance of p value at <0.05 . Chi-square test was applied to compare the groups and sub-groups depending on nature of the variables involved. Ethical clearance for the study was obtained from the Institutional Ethics Committee.

Results and Discussion

A total of 2963 medico-legal cases were registered during the period 2011-12, of which poisoning cases accounted for 6.88% ($n=204$), in comparison to 4697 medico-legal cases during the years 2018-19 where poisoning cases accounted for 8.9% ($n=418$), suggesting a significant rise of 2.02% in poisoning cases during 2018-19 ($\chi^2=3.89$; $df=1$; $p<0.05$). This sharp uptrend in the recent years could be due to various reasons like rising population, increasing demands, competition amongst people to perform better, work pressure, intra/inter-personal conflicts thereby leading to frustration intolerance, rejection sensitivity, depression and suicidal tendencies.

Young adults formed the majority in both the groups accounting for one-third of the cases, with most common age group being 21-30 years [Table 1], which is in concordance with most Indian studies like that done in south India,² and that done in north India,³ possibly due to stressors like professional failure, failure in love or competitive exams, and family discordance suffered by people in this age group.

Of a total 622 poisoning cases, males ($n=329$; 52.89%) outnumbered females ($n=293$; 47.11%) during both the time periods. The higher incidence in males could be due to the fact that males are more exposed to stress and strain due to financial difficulties, workplace stress and/or discord at home. This is in concordance with other Indian studies.^{4,5} During the years 2011-12, males ($n=114$; 55.89%) outnumbered females ($n=90$; 44.11%) with a ratio of 1.26:1, in comparison to males ($n=215$; 51.43%) and females ($n=203$; 48.57%), with a ratio of 1.05:1 during the years 2018-19. This finding showed

statistical significance across age groups in total cases ($\chi^2=15.04$; $df=6$; $p<0.05$) and female gender ($\chi^2=18.59$; $df=6$; $p<0.05$), but not in males ($\chi^2=3.19$; $df=6$; $p>0.05$) [Table 1]. This implies rising trends of poisoning cases across all age groups, especially in female gender in recent years, thereby suggesting females as almost equally affected as males. As majority of females in present study were housewives, possibly they were prone to suffer from loneliness and depression, alcoholism by husband, financial difficulties, abuse by spouse or in-laws in connection with dowry, etc. This finding is in agreement with an Indian study that reported females as being the commonest victims.⁶

Poisoning was more common in the married group in both time periods, although statistically no significant difference was found between two time periods [Table 1]. This finding is consistent with studies done in other parts of India as well.^{7,8} This may imply that maladaptive stressful marital life can act as a triggering factor for suicidal behaviour in vulnerable individuals, especially in the Indian context where an early marriage along with its added familial responsibilities can be synergistic factor.

In present study, self-ingestion was the commonest manner of poisoning, especially among adults and elderly; only few were accidental (especially among children) and none were homicidal in both the groups [Table 1]. This is in agreement with other Indian studies.^{3,9} Possibly, people resort to suicidal attempts by poisoning due to many reasons like easy availability and accessibility to poisonous substances, lower need for strenuous efforts compared to other suicidal acts, their belief that poison terminates life with minimal suffering. It is also quite possible that few amongst accidental poisoning victims might have under reported their suicidal behaviour due to sensitivity of stress, social stigma of suicide and fear of legal procedures thereto. However, in an Indian study although majority of the poisoning cases were accidental in nature, deaths were more in poisoning of suicidal manner.⁵ This may be due to the differences in study design, psychiatric consultation, tactic eliciting of clinical history and stressful factors that have major influences in categorising the manner of poisoning act as suicidal or accidental or homicidal.

During the years 2011-12, majority of the poisoning cases were farmers ($n=57$; 27.94%) compared to housewives ($N=140$, 33.49%) during the years 2018-19 [Table 2]. There was a statistically significant difference

between the two study periods in relation to occupation and poisoning. India being an agrarian country, farmers have easy access and occupational exposure to the poisonous substances like pesticides, insecticides, or rodenticides and thus are commonly affected victims. In the recent years, with increasing incidence of poisoning in the female population, housewives comprised the vulnerable group. However, some Indian studies reported manual labourers to be more commonly affected than others,^{4,10} while another Indian study reported students and unemployed youths as the most common victims¹¹. These differences can be due to different study settings and methodologies.

Organophosphorus compound was the commonest poison in both the time periods, owing to its easy availability [Fig. 1]. This finding is consistent with most of the Indian studies,^{5,10} although studies from northern parts of India have reported aluminium phosphide as a common cause of poisoning⁸. Rise in drug overdose cases is gaining popularity in recent years as a means of poisoning in majority of victims in their second and third decades, especially in students and housewives.¹² This could possibly be due to easy availability and accessibility to all types of medicines over the counter

with no strict law enforcement to check prescription delivery, and risk factors like academic stress, unhealthy competition, failure in relationships, and family conflicts. Such individuals are prone for depression and have an access to psychiatric drugs. Common tablets that were consumed included psychotropic medications (benzodiazepines, anti-depressants, anti-psychotics, carbamazepine, valproate), paracetamol and antihypertensives. This study also observed a rising trend in consumption of non-conventional, local-made pesticides that have no mention of the ingredients leading to therapeutic challenges that funnel mostly on clinical presentation.

During the years 2011-12, mortality was noted in 14 cases (6.9%), of which 12 cases (85.71%) were due to organophosphate poisoning, compared to 28 cases (6.7%) during in the years 2018-19, of which 17 cases (60.71%) were due to organophosphorus poison and 6 cases (21.43%) due to other pesticides. Although some studies have reported higher mortality rate of 15%,^{4,10} lower mortality in our study could be due to early accessibility to health centre, early therapeutic interventions and sophisticated tertiary care centre facility.

Table 1: Changing trends in socio-demographic characteristics of poisoning cases by gender distribution.

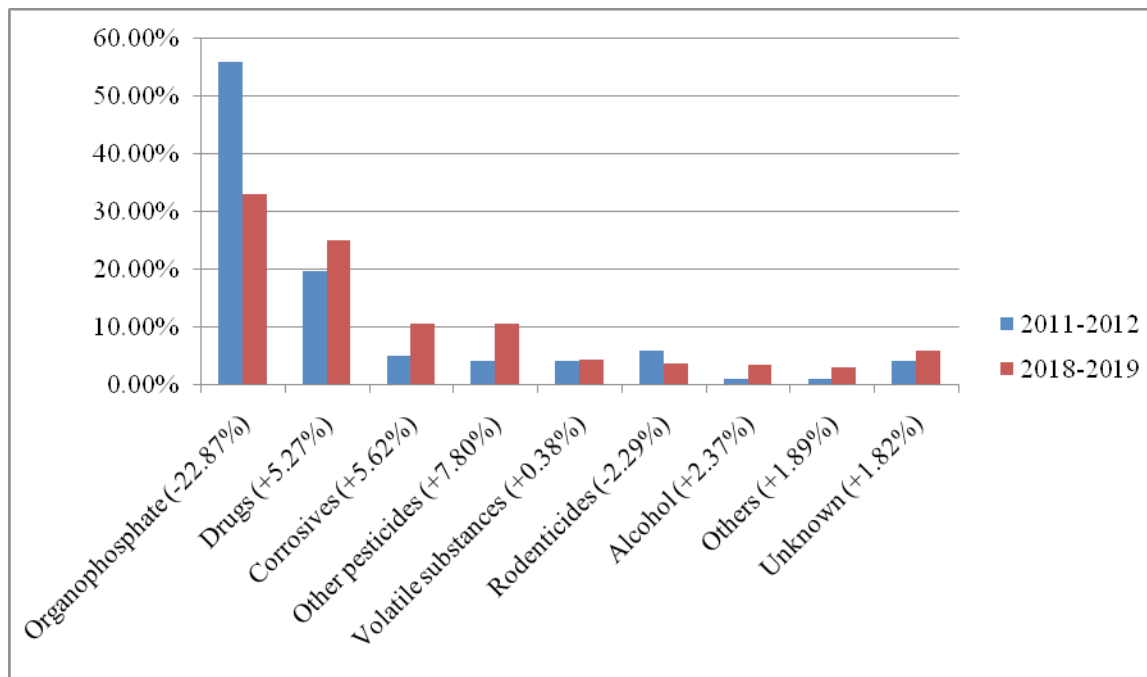
Variables		2011-12			2018-19			Statistics p<0.05 significant
		Males n=114 (%)	Females n=90 (%)	Total n=204 (%)	Males n=215 (%)	Females n=203 (%)	Total n=418 (%)	
Age in years	< 10	6 (5.26)	0 (0)	6 (2.94)	12 (5.58)	10 (4.93)	22 (5.26)	χ^2 for males=3.19, df=6, p>0.05, NS*; χ^2 for females=18.59, df=6, p<0.05, significant. χ^2 for total cases=15.04, df=6, p<0.05, significant.
	11-20	18 (15.79)	32 (35.56)	50 (24.52)	34 (15.81)	47 (23.15)	81 (19.38)	
	21-30	56 (49.12)	44 (48.89)	100 (49.02)	89 (41.40)	75 (36.95)	164 (39.23)	
	31-40	16 (14.04)	6 (6.67)	22 (10.78)	43 (20.00)	37 (18.23)	83 (19.86)	
	41-50	10 (8.77)	4 (4.44)	14 (6.86)	18 (8.37)	16 (7.88)	34 (8.12)	
	51-60	4 (3.51)	2 (2.22)	6 (2.94)	7 (3.26)	10 (4.93)	17 (4.07)	
	> 61	4 (3.51)	2 (2.22)	6 (2.94)	12 (5.58)	8 (3.94)	20 (4.78)	
Marital status	Married	62 (54.39)	60 (66.67)	122 (59.80)	105 (48.84)	143 (70.44)	248 (59.33)	χ^2 for males=0.92, df=1, p>0.05, NS χ^2 for females=0.42, df=1, p>0.05, NS χ^2 for total cases=0.01, df=1, p>0.05, NS
	Single	52 (45.61)	30 (33.33)	82 (40.20)	110 (51.16)	60 (29.56)	170 (40.67)	
Manner of poisoning [^]	Suicidal	96 (84.21)	84 (93.33)	180 (88.24)	182 (84.65)	176 (86.70)	358 (85.65)	χ^2 for males=0.01, df=1, p>0.05, NS; χ^2 for females=2.75, df=1, p>0.05, NS. χ^2 for total cases=0.79, df=1, p>0.05, NS
	Accidental	18 (15.79)	6 (6.67)	24 (11.76)	33 (15.35)	27 (13.30)	60 (14.35)	

*NS=not significant; ^none of the cases were reported to be homicidal in nature;

Table 2: Changing trends in distribution of poisoning cases according to occupation

Occupation	2011-12	2018-19	Percentage change (%)
	n=204 (%)	n=418 (%)	
Farmers	57 (27.94)	120 (28.71)	0.77
Housewives	50 (24.51)	140 (33.49)	8.98
Students	45 (22.06)	105 (25.12)	3.06
Others	28 (13.73)	42 (10.05)	-3.68
Unemployed	24 (11.76)	11 (2.63)	-9.13

$\chi^2 = 26.152$, $df=4$; $p < 0.05$; significant (Others - include businessmen, drivers, labourers, teachers and children less than 5 yrs)



$\chi^2 = 41.201$, $df=8$, $p < 0.05$; significant (Others - includes plant poisons, glass pieces)

Figure 1: Changing trends in distribution of poisoning cases by type of poisonous substance

Conclusion

The study on changing trend in poisoning will give an idea about the current patterns which would help in early diagnosis by the common clinical manifestations associated with it and will also help in developing the analytical method used for detecting the poison. Rising trend in the number of poisoning cases over the recent years, especially drug overdose and local-made pesticides is quite alarming.

The study also highlights the importance of proper labelling of the ingredients and restricting the sale of non-conventional agricultural poisons along with proper education about safe handling as well as hazards of agricultural poisons. Strict legislative measures must

be implemented regarding the sale of 'over the counter' drugs to tackle the recent rising trend of drug overdose. Epidemiological surveillance is necessary for every region to identify problems prevalent in that region, so that preventive measures can be taken accordingly.

Conflicts of interest: Nil

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