

ORIGINAL ARTICLE

A Retrospective Analysis of Pattern of Suicide in Autopsied Cases in a Tertiary Care Hospital

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Abstract

Background: The National Crime Records Bureau of India reported a decline in suicide rate from 2010 through 2014. We conducted this study to know whether our hospital data reflects the national data and to know the age and gender specific differences in selecting methods of suicide.

Methods: We conducted a retrospective analysis of autopsied cases in Department of Forensic Medicine in a tertiary care hospital in central Kerala, India. Data on age, gender, cause of death of autopsied cases with alleged history of deliberate self-harm (DSH) were noted.

Results: Mean age of study population was 43.4±24.4. There were 59.3% males and 40.7% females, but young females outnumbered young males. Majority of cases were hanging (n=1325), followed by poisoning (n=1169), burns (n=809), drowning (n=626) and others (n=401). Hanging and poisoning were the common methods chosen by males while burns and poisoning were the common methods by females. The number of DSH cases was 1,040, 866, 771, 837 and 826 in each year from 2010 to 2014, respectively. Number of poisoning cases was declining steadily from 350 to 163 while non-poisoning suicide was not showing any steady changes (690, 578, 514, 657, and 663). Pesticides were the most common agent recorded in the autopsy sheet while corrosives, plant toxins, cyanide, toxic alcohol and drug overdose were less common. Quinalfos, chlorpyrifos and carbofuran were the commonly identified pesticides on chemical analysis.

Conclusion: There is a decrease trend in the number of suicides over the 5 years from 2010 through 2014 with a decrease in suicide due to poisoning. Though there is minimal increase in suicide due to hanging, it did not affect the total number of suicides.

Keywords: Burns; Drowning; Pesticides; Poisoning; Suicide

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INTRODUCTION

Deliberate self-harm (DSH) is one of the major causes of mortality and morbidity worldwide. The category of intentional injuries includes self-inflicted injuries and suicide, violence and war. The burden of intentional injuries is increasing among economically productive young adults (1). In ranking of diseases, suicide including poisonings comes in 21st place while suicide and nonfatal suicide attempts together are in 11th position of most important diseases (2).

Poisoning is one of the common methods used for attempted and completed suicide in Asia-Pacific region and the agents used are different from western countries and the mortality is high (3). Lack of awareness among people, easy accessibility and unsafe practice of handling make pesticide poisoning a common method of suicide in developing countries (3). Poisoning was found to be responsible for half

of the suicide deaths in India out of which pesticide causes majority of deaths. Young adults of 15-29 years, especially females, are affected by this and more in rural population as per national representative survey (4).

Regulation in the field of toxicology is regarded as a determinant of health (5). Restriction of selling poisons, diluted forms of poisons for sale, banning of highly hazardous poisons, etc. are practiced worldwide to reduce poison induced mortality and morbidity (6). The total number of suicides in Sri Lanka fell by 50% from 1996-2005 compared to 1986-1995 by restriction of pesticide sales – a reduction of approximately 19,800 suicides (7). But banning of some poisons has resulted in reciprocal increase in mortality as people resorted to other methods for suicide like hanging and drowning which cause immediate death (7). Hence, hospital data may not be the true indicator of death due to DSH as death occurring before reaching hospital constitutes a major number of total deaths.

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The National Crime Records Bureau’s report of India showed a decline in suicide rate from 2010 through 2014 (8). The data from our area show pesticides constitute major agents used for deliberate poisoning, and other common agents used by patients admitted in our hospital are rodenticides, plant poisons, drugs, etc (9, 10). But according to many studies, major percentage of mortality in poisoning cases occurs before reaching hospital (11). By studying autopsied cases with deliberate self-harm, both treated and untreated cases are analysed.

The objective of the study was to analyse the methods adopted for suicide in our area; age and gender differences in selecting the methods; any change in pattern of agents used for suicide over 5 years and to know any change in the number of deaths due to pesticides over the past 5 years.

METHODS

We conducted a retrospective analysis of autopsy records in Department of Forensic Medicine in a tertiary care hospital in central Kerala, India during the period 2010 to 2014. The Department of Forensic Medicine in our hospital gets cases for autopsy from three neighbouring districts (population of nearly 28 lakhs, 31 lakhs and 41 lakhs in these districts as per 2011 census). Treated cases of DSH from our hospital and other hospitals are taken to this department by police officers. Those cases died before reaching hospital for treatment are also taken to this department for autopsy. Since our hospital is the single centre in the three districts with a full fledged forensic medicine department with police surgeon, investigating officers send bodies for autopsy to our centre in case of alleged DSH so that the data from this centre can

represent that of central Kerala. All cases of alleged DSH underwent autopsy and viscera sent for chemical examination. Data on age, gender and cause of death were noted. Chemical analysis report of viscera was noted according to the report from chief chemical examiner to Government, Kakkanad, Kerala. Requisition given by the investigating police officer, hospital documents whenever available in treated cases and autopsy notes were analysed for collection of data. All cases of alleged history of DSH as per police statement were included in the study. All unknown bodies were excluded from the study population. Any suspicion of alleged homicide or accident was also excluded from the study population. Data were entered in Microsoft Excel sheet and analysed using EPI info version 7. Continuous variables were expressed using mean and median. Using frequency and percentage, descriptive statistics were assumed as appropriate. Correlation analysis was used to evaluate the strength of relationship between the two variables.

RESULTS

During the study period, there were 7,851 autopsies performed in which 4,340 cases were suicide (55.3%). Mean age of the study population was 43.4±24.4 (median 42, IQR 28). There were 59.3% males and 40.7% females. Majority were in the young age group, followed by middle-aged group (Table 1).

Majority of DSH cases were due to hanging (n=1,325) followed by poisoning (n=1,169) (Table 2). Males outnumbered females except in burns when subgroups of suicide were analysed – 72.7% males and 27.3% females

Table 1. Age and gender distribution of the study population

Age group	Gender [No. (percent)]		
	Males	Females	Total (%)
Adolescent (13-17)	63 (2.45%)	152 (8.61%)	220 (5.06%)
Young (18-44)	1,093 (42.46%)	1,005 (56.91%)	2,093 (48.22%)
Middle age (45-59)	862 (33.48%)	251 (14.21%)	1,113 (25.65%)
Elderly (60 and above)	556 (21.61%)	358 (20.27%)	914 (21.07%)
Total	2,574 (100%)	1,766 (100%)	4,340 (100%)

Table 2. Trend of suicide pattern during the study period

Year	Total autopsy	DSH	Poisoning	Hanging	Burns	Drowning	Others
2010	1739 (22.15%)	1040 (23.96%)	350 (29.94%)	253 (19.09%)	174 (21.51%)	165 (25.94%)	98 (24.44%)
2011	1581 (20.14%)	866 (19.95%)	288 (24.64%)	256 (19.32%)	152 (18.79%)	95 (14.94%)	75 (18.70%)
2012	1475 (18.79%)	771 (17.77%)	188 (16.08%)	257 (19.40%)	130 (16.07%)	120 (18.87%)	76 (18.95%)
2013	1535 (19.55%)	837 (19.29%)	180 (15.40%)	290 (21.89%)	174 (21.51%)	122 (19.18%)	71 (17.71%)
2014	1521 (19.37%)	826 (19.03%)	163 (13.94%)	269 (20.30%)	179 (22.12%)	134 (21.07%)	81 (20.20%)
Total	7851 (100%)	4340 (100%)	1169 (100%)	1325 (100%)	809 (100%)	636 (100%)	401 (100%)

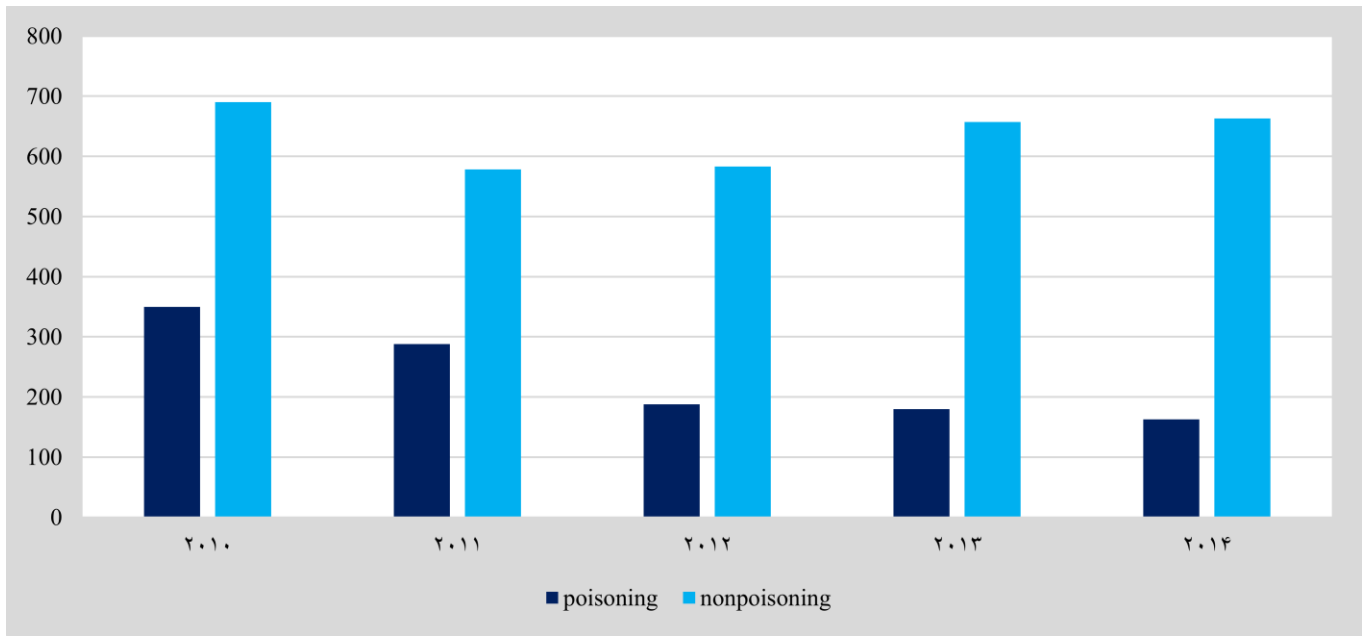


Figure 1. year-wise pattern of poisoning & non poisoning suicides

among poisoning cases; 62.6% males and 37.4% females among hanging cases; 64.8% were males and 35.2% were females in drowning cases; 69.1% females and 30.9% males among burning cases.

Among the study population, females commonly used burns (36%) and hanging (36%) as suicide methods followed by poisoning (14.3%) and drowning (10.4%), whereas males used hanging (42.01%) as commonest method followed by poisoning (26.02%), drowning (13.3%) and burns (10.9%).

Poisoning as a suicide method was used commonly by young people (33%) and elderly (33%) followed by middle-aged (30.4%). Hanging was used by young (59.2%) followed by middle-aged (25.6%) and elderly (12.8%). Burns was chosen by young (50%) followed by elderly (21.1%) and middle-aged (20.1%). Drowning was the method commonly seen in young (48.2%) followed by middle-aged (24.5%) and elderly (24.1%).

Number of poisoning cases was showing a decrease in the trend from 2010 to 2014, but there were no much changes in the number of non-poising DSH cases (Figure 1). There is a correlation between the decrease in the number of poisoning and the total number of suicides ($r = 0.77$, $p=0.05$), but no correlation was observed between the number of poisoning suicides and other suicides.

Pesticides constituted majority of the poisons that caused death ($n=365$, 31.2%) (Table 3). The most identified pesticides on chemical analysis were Quinalphos ($n=123$), Chlorpyrifos ($n= 87$), Carbofuran ($n= 79$), Lambda cyhalothrin ($n= 27$), Dimethoate ($n= 6$) and Monocrotofos ($n=3$).

Other compounds commonly identified in chemical analysis were formic acid ($n= 25$), cyanide ($n=27$), Oduku plant ($n= 35$), and oleander plant ($n=14$). There were 15

Table 3. Poisons used for suicide

Agent	Number (% of poisoning cases)
Corrosives	53 (4.53%)
Carbamate pesticides	72 (6.16%)
Cyanide	25 (2.14%)
Organophosphorus pesticides	226 (19.33%)
Other pesticides	67 (5.73%)
Toxic alcohols	30 (2.57%)
Plant toxins	52 (4.45%)
Drug overdose	15 (1.28%)
Others	100 (8.56%)
Poisoning* (negative chemical analysis)	529 (45.25%)
Total	1,169 (100%)

*Recorded in the autopsy record as alleged history of poisoning. Further clinical details were not available. No definite opinion on the nature of poison could be reached at autopsy.

cases of drug overdose among the study population in which two cases showed Clozapine and one case Dapsone on chemical analysis while others were negative on analysis.

DISCUSSION

The total number of DSH was coming down from 2010 through 2014 (from 1,040 to 826). Young age group and males predominated the study population which parallels with the available data. But on further analyzing the data,

poisoning was commonly used by young and elderly, other methods were commonly used by young people. Hanging was the method least used by elderly.

Young females outnumbered males in the study, whereas males were more in number in other age groups. Epidemiological studies from Tamil Nadu support these data that suicide rates in young females outnumber male rates at the age of 15-24 years (12, 13). Patel et al. have found that female suicide rate peaked at 15-29 age group and falls in older age group, while in men the rate is constant in all age groups (4).

Burns and hanging were the common methods chosen by female in the study which are highly fatal. Though hanging cases were commonest in male study population, burns were least. Females who are more used to working in kitchen choose burning as an easily available suicide method. Study based on WHO database shows that females commonly use pesticides and drowning as common methods for suicide, while men use hanging and firearms (14). Our findings differ from these data where poisoning comes in the 3rd place, drowning in the 4th place in female suicide and firearms are not at all common as a suicide method. But the use of burns as a suicide method among females observed in our study is consistent with that in India, Sri Lanka, Iran and middle-east countries (15).

The factors influencing suicide especially in young may be family factors, mental and physical illness and substance misuse (16). Identifying these factors were out of scope of our study design and a community based survey is necessary to identify these factors and to plan prevention programmes.

There was a decrease in the number of suicides over the study years. While poisoning cases were declining steadily over the years, other cases were not showing that trend. Though the non-poison cases also showed a reduction in 2011 and 2012, it later showed a minimum increase, but the total number of suicides showed an overall decrease. Since both poisoning suicide and total suicide showed a declining trend over the study period, linear regression analysis was done to evaluate the strength of the association between these two variables. The correlation coefficient is >0.5 ($r=0.77$), which represents a large association. So reduction in the number of suicides over the study period could be due to the reduction in poison suicides and it can have an impact on planning further suicide prevention strategies.

India has carried out extensive series of pesticide regulations to reduce the hazards associated with pesticide use (17). Twenty-eight pesticides, including several organophosphorus and organochlorine insecticides, together with some highly hazardous formulations (e.g. 50% carbofuran), have already been banned; and regulation for other highly hazardous pesticides will come into effect soon.

Decrease in pesticide suicides may be as a result of these regulations. In Bangladesh, Sri Lanka and South Korea there are reports of effective reduction of suicide number by restriction of highly hazardous pesticides (18-20). Increase in use of non-pesticide substances for suicide and decrease in agriculture returns are the two adverse events that can occur after banning pesticides. A study on agriculture outcome and use of pesticide is needed before banning the

commonly used pesticides and an alternative less hazardous pesticide should be made available for agricultural use.

Quinalphos, chlorpyrifos and carbofuran are the commonly identified compounds in our study which are highly hazardous according to WHO classification. These compounds are implicated as the causes of suicide in studies from other parts of India also, but compounds like monocrotophos and methyl parathion are not commonly identified in this study, unlike other Indian studies (21, 22).

LIMITATIONS

Single centre study may not be a good representative of national-wise or state-wise suicide pattern. Data was obtained from autopsy records retrospectively in which antemortem clinical data was not detailed. Chemical analysis report were negative in many cases because death had occurred after several days of hospital treatment. So nature of poison ingested were not obtained in substantial proportion of poison cases.

CONCLUSION

Highest number of suicides occurs in young population according to this study. Though males outnumber females in total study population, young females committed suicide more than young males. There is a decrease trend in the number of suicides over the 5 years from 2010 through 2014 with a decrease in suicides due to poisoning. Though there is a minimal increase in suicides due to hanging, it did not affect the total number of suicides. Community based studies are needed to identify the factors leading to suicide so that prevention programmes can be implemented.

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