

## **Original Research Article**

### **Analytical Study of Suicidal Deaths Due To Poisoning in Warangal Area**

**Dr.T.Krupal Singh<sup>1</sup>, Dr. T. Naveen<sup>2</sup>, Dr. LavanyaKowsil .G<sup>3</sup>, Dr.Jakkam Surendar<sup>4</sup>**

<sup>1</sup>Associate Professor, Department of Forensic Medicine, Kakatiya medical college, Warangal, Telangana-506007, India

<sup>2</sup>Department of Forensic Medicine, Kakatiya medical college, Warangal, Telangana-506007, India

<sup>3</sup>Department of Forensic Medicine, Gandhi medical college, Secunderabad, Telangana, India

<sup>4</sup>Assistant Professor, Department of Forensic Medicine, KIMS&RF, Amalapuram East Godavari, Andhra Pradesh-533201, India

#### **\*Corresponding author**

Dr.JakkamSurendar

Email: [surenderjakkam@gmail.com](mailto:surenderjakkam@gmail.com)

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**Abstract:** Suicide is taken as the biggest sin in all religions. Still the incidence is not coming down in any part of the world. Statistics are saying that 1/3<sup>rd</sup> of all unnatural deaths are because of suicides. Poisoning is one of the commonest methods of committing suicide especially in developing countries like India due to easy availability of poisons because most of the people dependent on agriculture work where poisons like pesticides and insecticides etc. are used. The present study is a prospective study in Kakatiya Medical College, Warangal during the period from January 2013 to June 2014 in the Department of Forensic Medicine. The total number of suicides committed by poisoning is coming to 337 in the study period. They are 186 (55.19%) in the calendar year 2013 and 151 (44.81%) in the first half year of 2014. Total number of males committed suicide by poisoning are 233(69.14%) and females are 104(30.86%) with a ratio of 2.24:1.265 (78.64%) persons are from low socio economic strata, and 181 (53.71%) are illiterates. Most of the deaths are committed by consuming Organo Phosphate compounds. Financial reasons are the leading precipitating factors for committing suicides in the present study and 118 (35.01%) persons died for this.

**Keywords:**suicides, poisons, precipitating factors.

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#### **INTRODUCTION**

Suicide is taken as the biggest sin in all religions. Still the incidence is not coming down in any part of the world. Statistics are saying that 1/3<sup>rd</sup> of all unnatural deaths are because of suicides. Enough education is made about the ill effects of such coward act, in spite; people are terminating their lives without any mercy on them and leaving their loved ones in agony. In the present day Suicide has become an emotional outlet. Life styles and Stress are becoming the precipitating factors to commit suicide. At the same time the broadcast media or the society is playing an irresponsible role in increasing the incidence of these preventable deaths. Unnecessary promotion of information to the borderline and indecisive people, is leading to their final event [1].

Poisoning is one of the commonest methods of committing suicide especially in developing countries like India due to easy availability of poisons because most of the people dependent on agriculture work where poisons like pesticides and insecticides etc. are used.

“Forensic Toxicology” deals with the medical and legal aspects of the harmful effects of chemicals or poisons on human beings [2].

Sections- 176, 193, 201, 284, 299, 300, 304A, 309, 320, 324, 326 and 328 of I.P.C. and Sections- 39, 40 and 175 of Cr. P.C. deal with offences relating to administration of poisonous substances. Sections 272 to 276 of I.P.C. deal with adulterated food and drugs [3, 4]. Suicidal poison on the contrary should produce immediate painless death, easily available and accessible, and should have a pleasant taste and smell [5-14].

#### **Aims and Objectives**

The magnitude of the suicidal deaths in the present day represents the tip of the iceberg. The present study is taken with the following aims:

1. To analyze the deaths occurring due to Poisoning, which were subjected to Post mortem examination, who intended to commit suicide
2. To have a comprehensive approach to these deaths, so that we can understand the incidence of such suicidal poisoning in regard to their circumstances

and the preventive measures that can be adopted.

## MATERIAL AND METHODS

### Inclusion Criteria:

1. All died with an allegation of suicide by poisoning, as mentioned in the Inquest, which are subjected to Post-mortem examination in the mortuary of Kakatiya Medical College, Warangal during the period from January 2013 to June 2014, registered in the Police Stations coming under the Jurisdiction of Department of Forensic Medicine, Kakatiya Medical College Warangal.
2. All the suicidal poisoning deaths where the final opinion is dispatched based on the FSL reports.
3. All the suicidal poisoning deaths irrespective of the Investigating Officer (as Police or Tahsildar) are selected.
4. Deaths occurred in the spot and deaths occurred while undergoing treatment is selected.

### Exclusion criteria:

1. Cases in which the manner of death is not clearly mentioned in the inquest or any ambiguity is expressed about the cause of death.
2. Cases without final opinions
3. Unidentified dead bodies are discarded.
4. Decomposed bodies are discarded where the post-mortem examination findings are not clear.
5. Exhumation bodies are not selected.
6. Spot post-mortem examinations are not selected.

## RESULTS

The number of Post mortem examinations conducted by the Department of Forensic Medicine Kakatiya Medical College, Warangal are 1661 in 2012 and 1440 in 2013. The total number of suicides committed by poisoning is coming to 337 in the study period. They are 186 (55.19%) in the calendar year 2013 and 151 (44.81%) in the first half year of 2014

Total number of males committed suicide by poisoning are 233(69.14%) and females are 104(30.86%) with a ratio of 2.24: 1. The age distribution of the victims is showing increased incidence between 21 years to 50 years in both sexes. The total number of Post mortem Examinations done in the age groups coming under 21 years to 50 years is 262(77.75%). Among them 198(75.57%) are males and 64(24.43%) are females. There are no deaths seen in the age group less than 10 years of age group who committed suicides. Female between 11 years and 20 years 26 (7.72%) in number who are more than their counter part genders who are only 6 (1.78%). The youngest girl to commit suicide is 12 years. Old person who are more than 80 years are also seen in the present study who committed suicide by poisoning. Eldest person committed suicide is 86 years male, according to inquest .The average age of the male victim is 37.5

years and the of the female victim is 24.4 years. (Tab-1).258 (76.56%) persons are married among the 193 (57.27%) are males and 65 (19.29%) are females. 71 (21.07%) are unmarried and 8 (2.37%) are widowed. (Tab-2).

265 (78.64%) persons are from low socio economic strata; 72 (21.36%) persons are from middle socio-economic strata and there is no record is available from high socio economic strata .181 (53.71%) are illiterates; 114 (33.83%) has primary education; 29 (8.61%) has secondary education; 10 (2.97%) are graduates and 3 (0.89%) are professionals (Tab-3).

303 (89.91%) are habitat in rural areas; 18 (5.34%) are from sub-urban area of towns and 16(4.75%) are living in city. 102 (30.27%) are farmers by their occupation; 85 (25.22%) are daily laborers; 27 (8.01%) are skilled laborers as toddy tappers, weavers, tailors etc. 26 (7.72%) woman are home makers; 24(7.12%) are students; 22 (6.53%) has employed in private agencies; 16 (4.75%) has their own business; 4 (1.16%) are government employees, 31 (9.20%) victims are not working anywhere (Tab-4). 30 (8.90%) persons died on the spot they consumed the poison as they are not observed immediately after the consumption. 20 of them died in open places and 10 of them died in their own house. In rest of the persons there are attempts made to rescue them by taking to medical care. 82 (24.33%) of them are attended deaths and died within 6 hours from consumption. 122 (36.20%) persons survived between 6 to 24 hours. 51 (15.13%) persons died in between 1 to 3 days. And another 52 (15.43%) persons had a longer hospital stay and died after three days. The longest stay in the hospital was 21 days for a case of organophosphate poisoning. As many as 265 (78.64%) deaths occurred in hospital; 16 (4.75%) persons died in their own houses; 28 (8.31%) persons died in open areas; 24 (7.12%) died on the way to hospital and 4 (1.19%) persons died in others houses (Tab-5).

Most of the deaths are committed by consuming Organo Phosphate compounds. They accounted for 289 (85.75%) deaths of total 337. 8(2.37%) persons consumed Organo Chlorine compounds; 2 (0.59%) persons consumed Carbamate; 11 (3.26%) persons consumed Phosphide (Rodenticide); 4 (1.19%) people died of excess alcohol intake; 9 (2.67%) persons consumed corrosive acids and another 14 (4.15%) persons consumed other poisons as, Imidacloprid, Supervasmol, Atenolol, Sedatives and diphenyl hair dyes (Tab-6 and 7).

Financial reasons are the leading precipitating factors for committing suicides in the present study and 118 (35.01%) persons died for this. The next leading factor is the health problems, which are varying from

pain abdomen in the young female to incurable disease in elderly persons. 56 (16.62%) persons committed suicide by poisoning for their marital disharmony, among them female are more in number. Maladjustment with the family members is also another leading cause and 29 (8.61%) persons are died for this reason. Unsound mind has taken 21 (6.23%) lives. Failure in love has taken 16 (4.75%) person and failure in education 11 (3.26%) persons. Infertility is reason in 3

p(0.89%) people to commit suicide and in other 2 (0.59%) persons quarreling with neighbors and employment problems. Financial problems are common in males than females. Health problems are leading cause in females. Infertility has taken only females lives. Failures in education and in love are more among the females to commit suicides. Marital disharmony and maladjustment with family is equal in both genders. (Tab-8 and 9).

**Table-1: No 1 Age and Sex Distribution**

Age group	Sex		Total (%)
	Male (%)	Female (%)	
0 to 10 yr	0	0	0
11 to 20 yr	6 (1.78)	26 (7.72)	32 (9.50)
21 to 30 yr	57 (16.91)	28 (8.31)	85 (25.22)
31 to 40 yr	44 (13.06)	15 (4.45)	59 (17.51)
41 to 50 yr	55 (16.32)	16 (4.75)	71 (21.07)
51 to 60 yr	42 (12.46)	5 (1.48)	47 (13.94)
61 to 70 yr	20 (5.93)	8 (2.37)	28 (8.30)
71 to 80 yr	7 (2.08)	4 (1.19)	11 (3.27)
81 to 90 yr	2 (0.59)	2 (0.59)	4 (1.18)
Total	233 (69.14)	104 (30.86)	337 (100)

**Table- 2: Marital statuses**

Marital status	Sex		Total (%)
	Male (%)	Female (%)	
Unmarried	40 (11.87)	31 (9.20)	71 (21.07)
Married	193 (57.27)	65 (19.29)	258 (76.56)
Widowed	0	8 (2.37)	8 (2.37)
Total	233 (69.14)	104 (30.86)	337 (100)

**Table-3: Education and Socio Economic statuses**

Educational status	Socio economic status			Total (%)
	Low (%)	Middle (%)	High	
Illiterate	166 (49.26)	15 (4.45)	0	181 (53.71)
Primary	85 (25.22)	29 (8.61)	0	114 (33.83)
Secondary	14 (4.15)	15 (4.45)	0	29 (8.61)
Graduation	0	10 (2.97)	0	10 (2.97)
Professional	0	3 (0.89)	0	3 (0.89)
Total	265 (78.64)	72 (21.36)	0	337 (100)

**Table-4: Habitat and Occupation of the deceased**

Occupation	Habitat			Total (%)
	Rural (%)	Sub-Urban (%)	Urban (%)	
Farmer	100 (29.67)	2 (0.59)	0	102 (30.27)
Business	12 (3.56)	2 (0.59)	2 (0.59)	16 (4.75)
Govt. Employ	0	0	4 (1.19)	4 (1.16)
Private Employ	18 (5.34)	2 (0.59)	2 (0.59)	22 (6.53)
Student	20 (5.93)	2 (0.59)	2 (0.59)	24 (7.12)
Home Maker	22 (6.53)	2 (0.59)	2 (0.59)	26 (7.72)
Skilled labour	21 (6.23)	2 (0.59)	4 (1.19)	27 (8.01)
No work	31 (9.20)	0	0	31 (9.20)
Daily labourer	79 (23.44)	6 (1.78)	0	85 (25.22)
Total	303 (89.91)	18 (5.34)	16 (4.75)	337 (100)

**Table-5: Relation between Period of survival and place of death**

Place of Death	Period of survival				Spot Death	Total (%)
	Within 6 hours	6 to 24 hours	1 to 3 days	More than 3 days		
Own house	2	2	2	0	10	16 (4.75)
Others house	2	0	2	0	0	4(1.19)
On the way to hospital	24	0	0	0	0	24(7.12)
Hospital Death	52	116	45	52	0	265(78.64)
Open areas	2	4	2	0	20	28(8.31)
Total (%)	82(24.33)	122(36.20)	51(15.13)	52(15.43)	30(8.90)	337(100)

**Table-6: Poisons consumed against age groups**

POISON CONSUMED	AGE GROUP								TOTAL (%)
	11 TO 20 YR	21 TO 30 YR	31 TO 40 YR	41 TO 50 YR	51 TO 60 YR	61 TO 70 YR	71 TO 80 YR	81 TO 90 YR	
ORGANO PHOSPHATE	24	75	52	58	43	22	11	4	289 (85.76)
ORGANO CHLORINES	4	2	2	0	0	0	0	0	8 (2.37)
CARBAMATE	0	0	0	2	0	0	0	0	2 (0.59)
PHOSPHIDE	2	0	0	7	2	0	0	0	11 (3.26)
ALCOHOL POISONING	2	0	0	2	0	0	0	0	4 (1.19)
CORROSIVE ACID	0	0	3	2	2	2	0	0	9 (2.67)
OTHER POISONINGS	0	8	2	0	0	4	0	0	14 (4.15)
TOTAL (%)	32	85	59	71	47	28	11	4	337 (100)

**Table-7: Poisons consumed against Occupation**

Poison consu Med	Occupation									Total (%)
	Farmer	Business	Govt. Employ	Private Employ	Student	Home Maker	Skilled labour	No work	Daily labourer	
OrganoPhos Phate	95	16	2	12	16	20	23	29	76	289
Organo Chlorines	2	0	0	0	4	0	0	0	2	8
Carba Mate	0	0	0	0	0	0	0	0	2	2
Phos Phide	0	0	2	2	2	0	0	0	5	11
Alcohol Poiso Ning	0	0	0	0	2	0	2	0	0	4
Corrosive Acid	3	0	0	0	0	4	2	0	0	9
Other Poisonings	2	0	0	8	0	2	0	2	0	14
Total (%)	102 (30.27)	16 (4.75)	4 (1.19)	22 (6.53)	24 (7.12)	26 (7.72)	27 (8.01)	31 (9.20)	85 (25.22)	337

**Table- 8: Precipitating factors against age groups**

Precipitating factor	Age group								Total (%)
	11 to 20 yr	21 to 30 yr	31 to 40 yr	41 to 50 yr	51 to 60 yr	61 to 70 yr	71 to 80 yr	81 to 90 yr	
Financial	2	25	33	27	23	8	0	0	118 (35.01)
Marital disharmony	2	23	11	14	4	2	0	0	56 (16.62)
Love failure	5	8	3	0	0	0	0	0	16 (4.75)
Failure in Education	9	2	0	0	0	0	0	0	11 (3.26)
Health problems	9	17	8	13	12	11	7	4	81 (24.04)
Infertility	0	0	0	3	0	0	0	0	3 (0.89)
Unsound mind	0	3	0	9	6	3	0	0	21 (6.23)
Maladjustment	3	7	4	5	2	4	4	0	29 (8.61)
Others	2	0	0	0	0	0	0	0	2 (0.59)
Total (%)	32	85	59	71	47	28	11	4	337

**Table-9: Precipitating factors against sex (percentages within the gender)**

PRECIPITATING FACTOR	SEX		TOTAL
	MALE	FEMALE	
FINANCIAL	108 (46.35)	10 (9.62)	118
MARITAL DISHARMONY	39 (16.74)	17 (16.35)	56
LOVE FAILURE	8 (3.43)	8 (7.69)	16
FAILURE IN EDUCATION	2 (0.86)	9 (8.65)	11
HEALTH PROBLEMS	36 (15.45)	45 (43.27)	81
INFERTILITY	0	3 (2.88)	3
UN SOUND MIND	19 (8.15)	2 (1.92)	21
MALADJUSTMENT	19 (8.15)	10 (9.62)	29
OTHERS	2 (0.86)	0	2
TOTAL	233 (100)	104 (100)	337

## DISCUSSION AND CONCLUSION

Suicide is one of the leading manners of deaths all over the globe and that is true even in Warangal tricities. It is found that the total number of deaths occurring due to suicidal poisoning are coming to 186 in the calendar year 2013 and 155 in the first half year of 2014. It was observed in a study made in 2007 in the same geographical area showing 186 suicidal poisoning deaths, in that calendar year. It shows the incidence of suicidal poisoning is almost same in these yesteryears. The male to female ratio was 1.58 in the past study

which is increased to 2.24 in the present study [3]. It indicates the females victims are coming down in their number who are committing suicides by poisoning method. By this we can make an inference that though the female suicides by poisoning are coming down in their number, but the overall numbers of suicides by poisoning are not coming down. It is sending an alarm about the increasing incidence of male suicides by poisoning .Females were found more in one of the studies made in Hong Kong with a male to female ratio of 1 : 2.7 [15].

The vulnerable age group found to be 21 years to 50 years with peaks in 21 years to 30 years and 41 years to 50 years for males and the peak in female is found in 21 years to 30 years of age group. The average is age to commit suicide in the present study is 37.5 years to male victims and 24.4 years for a female victim. This is little differing from the earlier study where the age group was 21 years to 30 years for both the genders [3]. 27.33 years of the western study [16].

Most of the victims are from low socio economic strata, illiteracy group and from rural back ground. This gives us information that these are the risk group persons on whom vigilance should be kept constantly. The same observation was made earlier also [3]. The people in urban or sub-urban area are adopting other methods to commit suicide as hanging or burns also. Farmers are at risk in the present study because of their easy access to the substance

No place is safe for consuming poison. It is found that victims have consumed poison equally in all places including outdoors and indoors. 30 persons (8.9%) were not seen immediately after they consumed the poison. They died on the spot. This is a voluminous number in expressing the unattended deaths. Majority of the victims are transported to the nearest hospital soon they witnessed the act. It is reflected by the number of deaths occurred in hospital or on the way to hospital.

The commonest poison consumed is Organo Phosphate compound. It is the same found in earlier studies also. This is because of the easy access to this insecticide. Recently OrganoChloro compound consumption is coming down as it is not preferred by the farmers as an insecticide. Phosphide molecule is also seen to be consumed in the present study in number of victims. The other rare chemicals observed in the present include, Imidacloprid, Diphenyl dyes, Drug over dosage etc [17, 18, 19, 20].

Financial problems are the leading precipitating factors, followed by the health problems which include pain abdomen in young persons and incurable diseases in elderly persons. The precipitating factors expressed as pain abdomen either in the inquest or elicited on personal enquiry appears to be untrue. Because it was expressed in many women that she had menstrual pain. But on dissection of uterus except in 4 women (3.85% of women) who showed menstrual phase of cycle, rest of all others who complained of pain abdomen are in non-menstrual cycle. Marital disharmony and maladjustment with family members is one of the important aspect to be addressed, as because these are all preventable deaths Unsound mind, addiction to alcohol are once again are preventable

deaths. Failure in education and failure in love should not become causes for committing suicide if proper counseling is given to the victims in time.

### Suggestions

1. Suicide is a universal phenomenon and also preventable by meticulous screening and counseling of the individuals.
2. The victim is always in a frustrated mood or depressed, wants to stay alone and will not talking to anyone.
3. The people in risk group as, from low socio economic group, illiteracy, rural background need continuous health education and counseling for their minor health ailments.
4. Sudden change in the attitude is the alarming sign, one should decode it in time
5. Approach to the insecticide is one factor which makes somebody to commit suicide because of its accessibility. So they should be kept in safe custody.
6. Stringent actions should be adopted in selling and handling of such harmful insecticides [16].
7. Leftover part of the insecticide should not be kept in the accessible area of the people, either it should be disposed properly or it should be stored properly in inaccessible areas to the normal living area
8. Suicide is an emotion, carried to others as a contagious disease. Strict vigilance should be kept on the media, so that the news of suicide should not be made to broadcast
9. Sec. 309 of I.P.C should be kept in to action and the persons making para-suicide attempts should be penalized under this section, which sends a message to the community that, committing suicide is a punishable crime
10. Proper counseling is to be extended to the girls in pubertal age and there should be proper health care provision to reduce their physical pain, induced by onset of menstruation
11. Old aged persons should be properly taken care especially when lose their life partner.
12. Counseling should arranged to all victims of unsuccessful attempts
13. People who had failure in education and love should be taken care properly by their family members.
14. Every PHC should be equipped with the first aid treatment, as a stomach wash tube, atropine, PAM, IV fluids etc. All the staff in the PHC should be trained to manage the poisoning cases effectively.
15. Preferably the victims should be shifted to the nearest tertiary care hospital as early as possible. There should be enough transport facility to transit these victims to the tertiary care hospital.
16. Telemedicine facility should be extended to all hospital dealing with poisoning cases.
17. Poison information center should be established at

least one in each state [21, 24].

18. Last but not the least, the bereaved family members should counseled properly.

**REFERENCES:**

1. Morgan BW, Geller RJ, Kazzi ZN; 'Intentional ethylene glycol poisoning increase after media coverage of antifreeze murders' - West J Emerg Med 2011;12(3):296-9
2. Apurba Nandi; 'Principles of Forensic Medicine' – 3<sup>rd</sup> Edition- New Central Book Agency (P) Ltd. 2012 :721-744
3. Narayan Reddy KSN; 'Essential of Forensic medicine and Toxicology' – 33<sup>rd</sup> edition, Jaypee publications 2014; 498-519
4. Parikh C.K; 'Text Book of Medical Jurisprudence Forensic Medicine and Toxicology' - 6<sup>th</sup> edition - CBS Publishers and Distributors 2012;8.1-8.19
5. Cotran, Kumar; 'Robbin's Pathologic Basis of Disease' - 6<sup>th</sup> edition -W.B.Saunders Company – 1999.
6. Guharaj P.V, Chandran M.R; 'Forensic Medicine'- Orient Longman -2003.
7. Jurgen Ludwig; 'Hand book of Autopsy Practice' – Humana press
8. Keith Mant; 'Taylor's Principles and Practice of Medical Jurisprudence'- 13<sup>th</sup> edition - B.I. Churchill Livingstone, New Delhi – 2001.
9. Keith Mant; 'Taylor's principles of Practice of Medical Jurisprudence'–B.I. Churchil Livingston – 1994.
10. Mason J.K., Purdue B.N; 'The Pathology of trauma' - 3<sup>rd</sup>ed - Arnold – 2000.
11. Nagesh Kumar G. Rao; 'Text Book of Forensic Medicine and Toxicology'- Jaypee Brothers New Delhi – 2000.
12. PekkaSaukko, Bernard Knight; 'Knight's Forensic pathology' – 3<sup>rd</sup> edition– Arnold – 2004.
13. Sharma RK ; 'Concise text book of Forensic medicine and Toxicology'2<sup>nd</sup>ed– Elsevier – 2008.
14. Subramanyam B.V; 'Modi's Medical Jurisprudence and Toxicology' - 22<sup>nd</sup>edition - Butterworth's India – 2001.
15. Jalali A, Savari M, Dehdardargahi S, Azarpanah A; 'The pattern of poisoning in southwestern region of iran: envenoming as the major cause' - Jundishapur J Nat Pharm Prod 2012; 7(3):100-5.
16. Zosel A, Bartelson BB, Bailey E, Lowenstein S, Dart R; 'Characterization of adolescent prescription drug abuse and misuse using the Researched Abuse Diversion and Addiction-related Surveillance (RADARS(®)) System' - J Am Acad Child Adolesc Psychiatry 2013;52(2):196-204.
17. Anthony L, Kulkarni C – 'Patterns of poisoning and drug over dosage and their outcome among in-patients admitted to the emergency medicine department of a tertiary care hospital' - Indian J Crit Care Med 2012;16(3):130-5.
18. Fook SM, Azevedo EF, Costa MM, Feitosa IL, Bragagnoli G, Mariz SR; 'Poisoning with household cleaning products in a city in Northeast Brazil' - Cad SaúdePublica 2013;29(5):1041-5.
19. Rebelo FM, Caldas ED, HeliodoroVde O, Rebelo RM; '[Intoxication due to pesticides in the Federal District of Brazil between 2004 and 2007 -analysis of notification to the Toxicological Information and Assistance Center' - CienSaude Colet 2011;16(8):3493-502.
20. Grigoryan H, Schopfer LM, Peeples ES, Duysen EG, Grigoryan M, Thompson CM, Lockridge O; 'Mass spectrometry identifies multiple organo phosphorylated sites on tubulin' - ToxicolApplPharmacol 2009;240(2):149-58 .
21. Kumar SV, Venkateswarlu B, Sasikala M, Kumar GV; 'A study on poisoning cases in a tertiary care hospital' - J Nat SciBiol Med 2010; 1(1):35-9.
22. Krenzelok E, MacPherson E, Mrvos R; 'Disease surveillance and nonprescription medication sales can predict increases in poison exposure' - J Med Toxicol 2008; 4(1):7-10.