

A PROSPECTIVE STUDY ON PREVALENCE OF POISONING CASES - FOCUS ON VASMOL POISONING

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ABSTRACT

Objective: In Kadapa region every year nearly 50 people die only due to poisoning of Super Vasmol. People are not using for their hair but to kill their life they are using regularly. To detect, evaluate the prevalence of different poisoning cases and to analyze the clinical symptoms, course and their outcome, assess the effectiveness of supportive therapy for Vasmol poisoning in the general medicine and emergency units of Rajiv Gandhi Institute of Medical Sciences Kadapa.

Methods: A prospective study was conducted for 6 months in RIMS Kadapa and results showed that the poisoning were due to various household products like Vasmol (a hair dye), Gamexane, Kerosene, Shampoos, Rat poisons, Phenol etc.

Results: Most commonly observed poisoning is with Vasmol that accounts to 62% followed by Organophosphorous 13%, Tablet 9%, Bites 4%, Kerosene 2% remaining poisons are considered as others which accounts 8%. Similarly in case of Vasmol poisoning women (70%) are more predominant than men. 58.4% were found to be between 12-25 years. Housewives (20%) who intentionally consumed Vasmol due to various reasons of family (84%), economic and psychiatric problem. Tracheostomy was undergone in 17% of cases due to severe laryngeal edema if not treated which may lead to respiratory distress. 19 death cases were recorded. The characteristic chocolate brown color of the urine could be confirmative evidence of Vasmol poisoning in poisoning of PPD. In our study 33% shown chocolate brown color urine.

Conclusion: We recommend that the selling of Vasmol hair dye containing PPD should be controlled and public education program should be initiated in this regard, so that mortality from Vasmol poisoning may be prevented, because availability of Vasmol hair dye containing PPD in home causes easy accessibility of this poison. The community should be educated not to do such activities which endanger their life.

INTRODUCTION

Throughout human history, intentional application of poison has been used as a method of assassination, murder, suicide, and execution.[1][2] As a method of execution, poison has been ingested, as the ancient Athenians did, inhaled, as with carbon monoxide or hydrogen cyanide, or injected. Many languages describe lethal injection with their corresponding words for "poison shot". Poison's lethal effect can be combined with its allegedly magical powers; an example is the Chinese *gu* poison. Poison was also employed in gunpowder warfare. For example, the 14th century Chinese text of the *Huolongjing* written by Jiao Yu outlined the use of a poisonous gunpowder mixture to fill cast iron grenade bombs.[3] The history of poison stretches from before 4500 BC to the present day. Poisons have been used for many purposes across the span of human existence, most commonly as weapons, anti-venoms, and medicines. Poison has allowed much progress in branches, toxicology, and technology, among other sciences.[4]

General protocol for the management of various poisons

Protocol for the management of super vasmol poisoning

Super Vasmol 33™ is an emulsion based hair dye commonly used in India.[5]

Ingredients

Paraphenylenediamine (< 4%), resorcinol, propylene glycol, liquid paraffin, cetostearyl alcohol, sodium lauryl sulfate, EDTA sodium, herbal extracts and preservatives and perfumes. Some of these ingredients like paraphenylenediamine and resorcinol are known toxicants with multi-organ effects, while the toxicity profiles of others are not known. [5]

Clinical manifestations

Respiratory, Musculoskeletal, Renal manifestations, Characteristic triad of features encountered. Early angioneurotic edema with stridor, Rhabdomyolysis with chocolate colour urine, acute renal failure.

General symptoms seen

Abdominal Pain, Vomiting, Diarrhoea (watery, bloody), Burning pain in throat, Breathing difficulty, Burns to the eye, Blurred vision, Arrhythmias, Shock, Slurred speech, Stupor, Coma.[6]

Treatment

Medical emergency, Gastric lavage, Monitor for respiratory distress, endotracheal intubation early if laryngeal oedema develops, metabolic acidosis, half normal saline and soda bicarbonate infusion, dialysis.

Aim and objectives

To detect, evaluate the prevalence of different poisoning cases and to analyze the clinical symptoms, course and their outcome, assess the effectiveness of supportive therapy for Vasmol poisoning in the general medicine and emergency units of a tertiary care teaching hospital of RIMS – Kadapa.

MATERIALS AND METHODS

Study design: Prospective observational Study

Study site: All general medicine and emergency (ICU) units at "RAJIV GANDHI INSTITUTE OF MEDICAL SCIENCES (RIMS) HOSPITAL", KADAPA, a 750 bedded tertiary care teaching hospital.

Study period: March 2011 to September 2011

Sample size: 680 Cases from all general medicine and emergency (ICU) unit

Ethical approval: The study was approved by the Institutional Review Board of P.R.R.M College Of Pharmacy and the Ethical Committee of RIMS, Kadapa.

Inclusion criteria

Patients admitted with consumption of Poison were part of this observational study irrespective of age, sex, socioeconomic status, Profession along with manner of administration of the poison.

Study procedure

Patient data collection proforma was prepared by slight modifications from the standard case sheet. We categorized the collected poisoning cases based on the type of poisoning, amount of consumption, reason for consumption and on other demographic parameters. Data was collected by reviewing the Patients case sheets and the following were collected i.e., demographic data of age, gender, education details, occupation, other available laboratory data, quantity of dye consumption, reason for poisoning, vital signs, coloration of urine, clinical presentations, patient medication were clearly observed and noted on the specially designed Patient data collection form and results were analyzed. Details of primary care after consumption and clinical symptoms till reporting to RIMS,

Kadapa were recorded. We collected the data and analyzed the presenting features and supportive methods and were correlated with reported data in different articles.

RESULTS

Total number of various poisonous cases

A total number of 680 poisoning cases have been collected in the departments of General Medicine and Emergency (ICU); results were shown in **table 1**.

Gender wise categorisation of various poison cases

Out of 680 cases, 268 (39%) were men and 412 (61%) were women; results were shown in **table 2 and 3**

Table 1: Total number of various poisonous cases

S. No.	Name of poisonous substances	Number of cases
1	Vasmol	419
2	Organo phosphorous	90
3	Tablet	62
4	Bites	25
5	Rat poison	15
6	Kerosene	11
7	Phenol	10
8	Pedicular	8
9	Unknown	8
10	Alcohol	7
11	Datura	4
12	Insecticide	4
13	Gammexane (Linden)	3
14	Aluminium phosphate	2
15	Scent	2
16	Hit	2
17	Shampoo	2
18	Propargite	1
19	Unknown lotion	1
20	Allout	1
21	Cracker powder	1
22	Bleaching powder	1
23	Petrol	1

Table 2: Genderwise categorisation of poison cases

Men	Women	Total
268	412	680

Table 3: Details of gender wise poisoning by various poisons

S. No.	Name of poisonous substances	Men	Women	Total
1	Vasmol	126	293	419
2	Organo phosphorous	66	24	90
3	Tablet	26	36	62
4	Bites	11	14	25
5	Rat poison	6	9	15
6	Kerosene	6	5	11
7	Phenol	4	6	10
8	Pedicular	1	7	8
9	Unknown	2	6	8
10	Alcohol	7	-	7
11	Datura	4	-	4
12	Insecticide	2	2	4
13	Gammexane (Linden)	-	3	3
14	Aluminium phosphate	2	-	2
15	Scent	-	2	2
16	Hit	1	1	2
17	Shampoo	2	-	2
18	Propargite	1	-	1
19	Unknown lotion	-	1	1
20	Allout	-	1	1
21	Cracker powder	-	1	1
22	Bleaching powder	-	1	1
23	Petrol	1	-	1
Total		268	412	680

Various poison cases

Out of 680 cases, majority of the cases were Vasmol poisoning 419 (62%) followed by 90 (13%) OP poisoning, 62 (9%) Tablet poisoning, 25 (4%) bites poisoning, 15 (2%) Rat killer poisoning, 11 (2%) kerosene poisoning and a very less cases of other poisoning cases were observed, results were shown in **figure 4**.

Age wise categorisation of various poison cases

Out of 680 cases, 351(51%) cases were found between the age group of 12-25 years, 196 (29%) were in between 26-35 years, 69 (10%) were in between 36-45 years, 33 (5%) were in between 46-55, 26 (4%) were in between 56-65 years and 5 (1%) were above 65 years, and the results are given in **table 5** and gender wise in **table 6**.

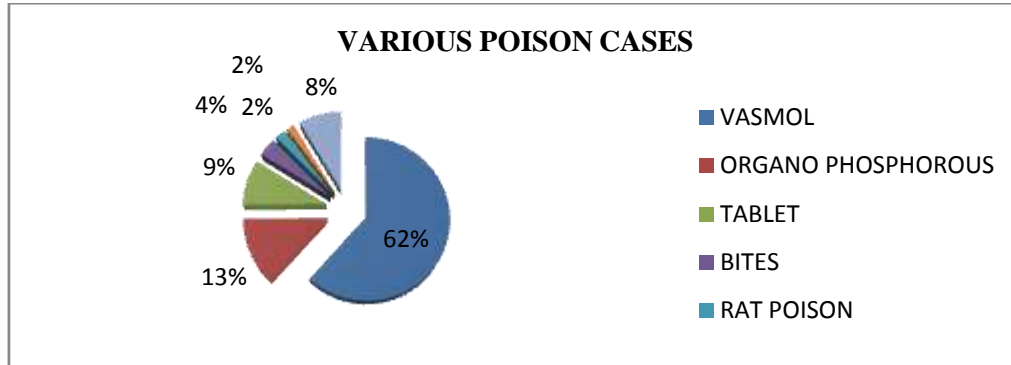


Fig. 4: Various poison cases

Table 5: Age wise categorisation of various poison cases

Age group	12-25 yrs	26-35 yrs	36-45 yrs	46-55 yrs	56-65 yrs	>65 yrs	Total
No. of cases	351	196	69	33	26	5	680

Table 6: Categorisation of poisonus cases based on age and gender wise

S. No.	Name of poisonous substances	Age in years										Total		
		12-25		26-35		36-45		46-55		56-65				>65
		M	F	M	F	M	F	M	F	M	F	M	F	
1	Vasmol	68	177	35	83	14	21	6	6	2	5	1	1	419
2	Organo phosphorous	13	14	21	6	13	2	10	1	8	1	1	-	90
3	Tablet	14	10	9	16	2	4	-	2	1	2	-	2	62
4	Bites	3	5	2	3	1	3	4	1	1	2	-	-	25
5	Rat poison	5	4	1	3	-	1	-	-	-	1	-	-	15
6	Kerosene	3	2	1	2	1	1	-	-	1	-	-	-	11
7	Phenol	2	3	2	3	-	-	-	-	-	-	-	-	10
8	Pedicular	1	4	-	2	-	1	-	-	-	-	-	-	8
9	Unknown	-	3	1	2	-	1	1	-	-	-	-	-	8
10	Alcohol	2	-	2	-	1	-	1	-	1	-	-	-	7
11	Datura	1	-	-	-	1	-	1	-	1	-	-	-	4
12	Insecticide	-	3	-	-	1	-	-	-	-	-	-	-	4
13	Gammexane (Linden)	-	3	-	-	-	-	-	-	-	-	-	-	3
14	Aluminium phosphate	1	-	1	-	-	-	-	-	-	-	-	-	2
15	Scent	-	2	-	-	-	-	-	-	-	-	-	-	2
16	Hit	-	1	1	-	-	-	-	-	-	-	-	-	2
17	Shampoo	1	-	-	-	1	-	-	-	-	-	-	-	2
18	Propargite	1	-	-	-	-	-	-	-	-	-	-	-	1
19	Unknown lotion	-	1	-	-	-	-	-	-	-	-	-	-	1
20	Allout	-	1	-	-	-	-	-	-	-	-	-	-	1
21	Cracker powder	-	1	-	-	-	-	-	-	-	-	-	-	1
22	Bleaching powder	-	1	-	-	-	-	-	-	-	-	-	-	1
23	Petrol	1	-	-	-	-	-	-	-	-	-	-	-	1
Total		116	235	76	120	35	34	23	10	15	11	2	3	680

Month wise distribution of various poison cases

Table 7 shows month wise distribution of poison cases. Out of 680 cases, majority of cases were observed in the month of May (188) followed by March (137), April (135), July (122) and June (98).

Based on number of death cases

A total of 49 (7.2%) deaths were reported throughout the study period and remaining were shifted to general medicine wards and got discharged after complete recovery and some were absconded,

referred to higher institution for better care. Results are shown in **table 8** and in **figure 9**.

Results related to super vasmol poisoning

Gender wise categorisation of vasmol cases

Out of 419 Vasmol poisoning cases, 293 (69.9%) were women including one pregnant woman and 126 (30.07%) were men. All the cases were intentional poisoning. Results were shown in **table 10**.

Table 7: Month wise distribution

Month	Total Vasmol cases	Total other cases	Total
March	80	57	137
April	84	51	135
May	124	64	188
June	60	38	98
July	71	51	122
Total	419	261	680

Table 8: Total no. of death cases

Vasmol poison death cases		Other poison death cases		Total cases
Men	Women	Men	Women	
9	10	25	5	49

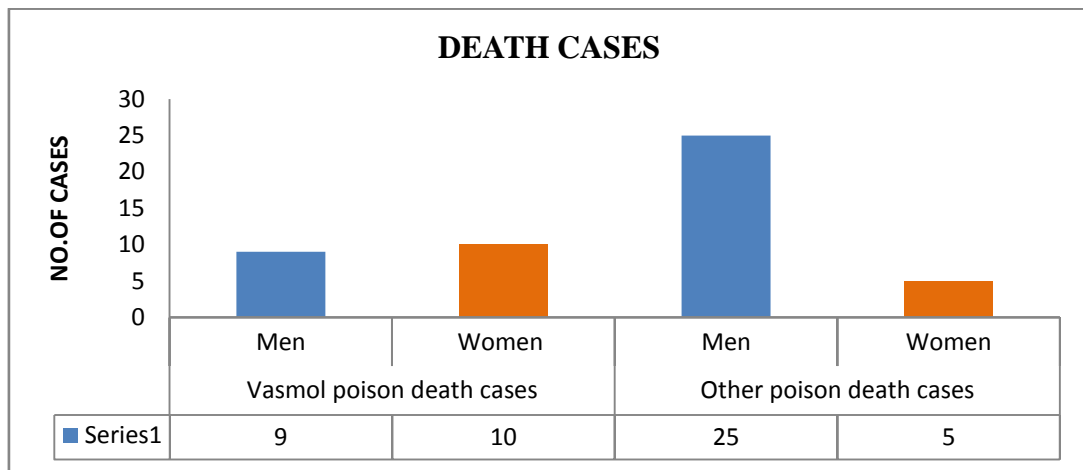


Fig. 9: Total number of death cases

Table 10: Gender wise categorisation

Name of poison substance	Men	Women	Total
Vasmol	126	293	419

Age wise categorisation of vasmol cases

Out of 419 cases, 245(58.4%) cases were found between the age group of 12-25 years, 118 (28.16%) were in between 26-35 years, 35 (8.35%) were in between 36-45 years, 12 (2.86%) were in between 46-55, 7 (1.6%) were in between 56-65 years and 2 (0.4%) were above 65 years, results were shown in **table 11**.

Socio demographic status

Out of 419 cases, 60 (14.3%) patients were literates, and remaining were illiterates especially coolie (50.1%) followed by house wives (19.5%). Results were represented in **table 12**.

Month wise categorisation of vasmol cases

Table 13 shows month wise distribution of cases, out of 419 cases majority of cases were observed in the month of May 124 (29.5%) followed by April 84 (20%), March 80 (20%), July 71 (16%) and June 60 (14%).

Various problems for intentional poisoning with vasmol

Majority of patients 353 (84%) consumed poison because of their family problems, 17 (2%) due to psychiatric conditions, 15 (2%) due to economic problems and 34 (8%) were due to health problems, unexplainable problems, threatening their family members and some other reasons. Results were shown in **table 14 & figure 15**.

Table 11: Age wise categorisation

Name of poison substance	Age in years											Total	
	12-25		26-35		36-45		46-55		56-65		>65		
	M	F	M	F	M	F	M	F	M	F	M		F
Vasmol	68	177	35	83	14	21	6	6	2	5	1	1	419

Table 12: Socio demographic status

Literates		Illiterates					Total
Students	Working	Coolie	House wives	Farmers	Drivers	Others	
42	18	210	82	28	24	15	419

Table 13: Month wise categorisation

Month	Vasmol cases		Total
	Men	Women	
March	16	64	80
April	25	59	84
May	41	83	124
June	17	43	60
July	27	44	71
Total	126	293	419

Table 14: Various problems for intentional poisoning

Family problems	Economical problems	Psychiatry	Others
353	15	17	34

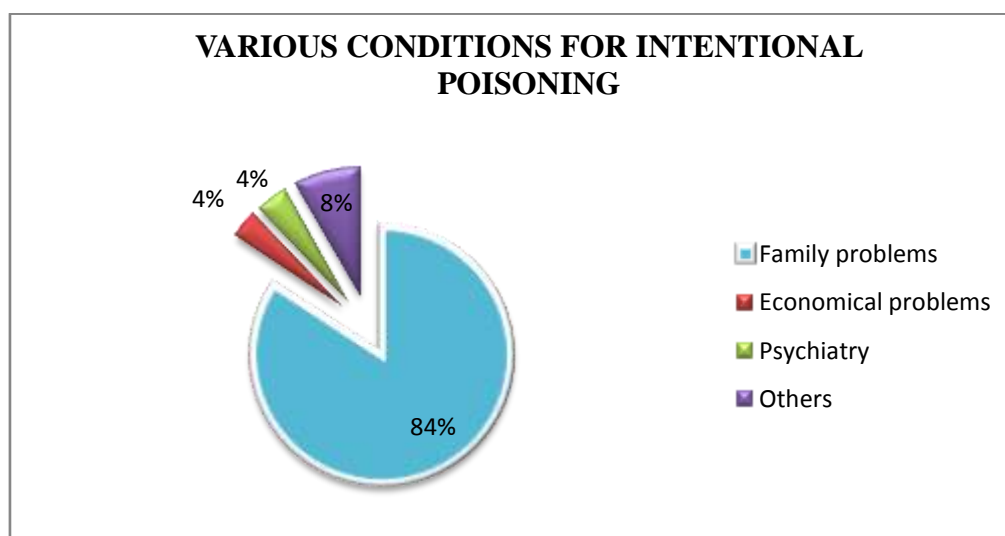


Fig. 15: Various conditions for intentional poisoning

Based on quantity of vasmol consumed

We categorized the patients based on the quantity of poison consumed. Out of 419 cases, 295 were consumed < 50 ml of Vasmol hair dye, 85 consumed 50-100 ml, 18 consumed 100-150 ml and 21 consumed above 150ml. Results were represented in **table 16**.

Discharge pattern of vasmol poison cases due to various circumstances

Out of 419 cases, 317 (75.6%) were recovered with the supportive therapy given by the hospital and discharged. 19 (4.5%) were died and 37 (8.8%) were referred to higher institution for better treatment, 27 (6.4%) were left against medical advice, 15 (3.5%) were absconded and finally 4 (0.9%) discharged by request. Results were represented in **table 17**. The death rate was found to be 1:22; out of 22 cases 1 death was observed.

Vasmol cases based on tracheostomy

The below table shows that out of 419 Vasmol poisoning cases, 71 were undergone tracheostomy. And all 71 were found to be consumed 100-150 or > 150 ml of poison. Results were represented in **table 18**.

Causes for death in vasmol poisoning: Out of 19 deaths due to different complications, 11 deaths were due to cardio-respiratory

failure, 5 due to Myocarditis, 2 due to cardiac arrest, and 1 due to acute renal failure. Results were represented in **table 19**.

Clinical features of vasmol poisoning

Out of 419 cases the predominant clinical features i.e. Cervicofacial edema were observed in 163 (38.9%) cases, followed by Stridor 102 (24.3%) cases, myalgia 79 (18.8%) cases, head numbness 56 (13.3%), gastrointestinal disturbances 37 (8.8%) and seizures 5 (1.1%). Results were represented in **table 20**.

Characterization of urine in vasmol poisoning

Rhabdomyolysis was observed in 135 (32.2%) cases, the severity explained with chocolate brown colour urination, 38 patient's urine colour was found to be yellowish and 246 patients with normal urine colour. Results were represented in **table 21**.

Renal profile in vasmol cases

Renal function was assessed in all 419 cases with serum creatinine and blood urea nitrogen, the range was 0.5-2.6 mg/dl and 2.10 - 57.0 mg/dl respectively. Results were shown in **table 22**.

Gastric lavage was done in only 11 cases and almost all the poisoning patients were treated with the following medication, given in **table 23**.

Table 16: Quantity of vasmol consumed

Quantity of Vasmol	Below 50ml	50-100ml	100-150ml	Above 150ml	Total
No. of cases	295	85	18	21	419

Table 17: Discharge pattern of vasmol poison cases due to various circumstances

Recovered	Referred to higher institution	Left against medical advise	Death	Absconded	Discharged at request	Total
317	37	27	19	15	4	419

Table 18: Number of cases undergone tracheostomy

Tracheostomy done	Without tracheotomy	Total
71	348	419

Table 19: Based on complications

Cardio respiratory failure	Myocarditis	Cardiac arrest	Acute renal failure	Total
11	5	2	1	19

Table 20: Signs and symptoms of vasmol poisoning

Clinical presentation	Number of cases	Percentage (%)
Cervicofacial Edema	163	38.9
Stridor	102	24.3
Myalgia	79	18.8
Head numbness	56	13.3
Gastrointestinal disturbances	37	8.8
Seizures	5	1.1

Table 21: Urine analysis

Normal colour urination	Yellow colour urination	Chocolate brown colour urination	Total
246	38	135	419

Table 22: Laboratory profile

Laboratory test	Range	Mean
Serum creatinine (mg/dl)	0.5-2.6	1.55
Blood urea nitrogen (mg/dl)	2.1-57	29.55

Table 23: Medication

Dosage form	Drug name	Strength	Route	No. of doses
Inj.	Hydrocortisone	200mg	I.V	B.D
Inj.	Lasix	1amp	I.V	B.D
Inj.	Avil	1amp	I.M	B.D
Inj.	Rantac	1amp	I.V	B.D
Inj.	Taxim	1gm	I.V	B.D
Inj.	Ringer lactate	1 pint	I.V	SOS
Inj.	5% DNS	1 pint	I.V	SOS
Inj.	Normal Saline	1 pint	I.V	SOS

DISCUSSION

Poisoning can be caused by swallowing, injecting, breathing, or being exposed to a poisonous substance. It is important to note that the absence of a warning on a package label does not necessarily mean that the product is safe.

Poisoning cause may vary like Medicines, household detergents, insecticides, paints (swallowing), cosmetics, gaseous poisoning, food poisoning, exposure to the toxic substances produced by some animals (e.g.: spiders and starfish), drug overdose (accidental or intentional). [7]

The growing incidence of poisoning from accidental, occupational or intentional exposure to chemicals has drawn worldwide attention. While global incidence of poisoning is not known, it is estimated that up to half a million people die each year as a result of poisonings, due to pesticides and natural toxins. [8]

In our study we found that the poisoning were due to various house hold products like Vasmol (a hair dye), Gammexane, Kerosene, Shampoos, Rat poisons, Phenol etc. Most commonly observed poisoning is with Vasmol, which is used to color hair. Majorly

Vasmol poisoning accounts to 62% followed by Organophosphorous 13%, Tablet 9%, Bites 4%, Kerosene 2% remaining poisons are considered as others which account 8%. Vasmol poisoning is common in Indian subcontinent and it is supported with our results.

In various poison cases women (61%) are more predominant than men; mean age of this group is between 12-25 years.

Similarly in case of Vasmol poisoning women (70%) are more predominant than men. 58.4% were found to be between the ages of 12-25 years. Socio demographic comparison shows that majority are illiterates in which labor (50%) and house wives (20%) who intentionally consumed Vasmol due to various reasons of family (84%), economic and psychiatric problems. Most of the patients consumed less than 50ml.

Vasmol contain Para-phenylenediamine (PPD) 4 % and resorcinol as major ingredients, PPD intoxication is most harmful than resorcinol, which is the reason for most of the complications in Vasmol poisoning. Generally Para-phenylenediamine has moderate acute toxicity by the oral route and low toxicity by the dermal route, in our study entire poisoning was by ingestion. It is worth mentioning that

the amount of PPD that can cause systemic poisoning is only three grams, while the lethal dose is 7-10 grams. In this study the consumed concentration was found to be around 4 grams.[9]

The main toxicities of this compound include severe edema of the face and neck frequently requiring emergency tracheostomy. This is followed by Rhabdomyolysis and acute renal failure, culminating in death if not treated aggressively.[10][11][12]and all these toxicities were observed in our study and which is supported by similar study like P Bhargava et al. [13]

Cervicofacial and laryngeal edema was the dominating presenting manifestation in 38.9% of the cases, 24.3% of the cases developed stridor, 18.8% had myalgia and 13.3% had head numbness. Tracheostomy was undergone in 17% of cases due to severe laryngeal edema if not treated which may leads to respiratory distress. 33% of the cases developed Rhabdomyolysis and had impaired renal functions, elevated blood urea nitrogen and serum creatinine were detected, 19 death cases were recorded during our study, 58% had cardio respiratory failure, 26% myocarditis,11% had cardiac arrest and 5% were acute renal failure. The characteristic chocolate brown color of the urine could be confirmative evidence of Vasmol poisoning in individual with the poisoning of PPD. [14][15][16][17].In our study 33% shown chocolate brown color urine.

Treatment is mainly supportive depending on clinical features at presentation. Tracheotomy is a life saving measure for an obstructed airway, and some patients may need endotracheal intubation. Antihistamines and steroids are commonly used because of the possibility of a hypersensitivity reaction to Vasmol poisoning but there is no evidence to support this mode of treatment. Alkaline diuresis using isotonic saline, sodium bicarbonate and diuretics is used in the management of Myoglobinuria with variable results. [18]

There is no specific antidote availability, and trials of Vasmol poison removal using hemoperfusion and hemodialysis had variable results. However, dialysis is an effective supportive measure in case of oliguria. [19]

CONCLUSION

Super Vasmol poisoning is a serious social issue to be considered in the south region of Andhra Pradesh; mainly Kadapa District.Vasmol Hair dye intoxication is a life threatening condition. Clinical outcomes rely on early recognition, prompt referral, and supportive therapy in collaboration with different specialties.

Label of Super Vasmol 33 showing that Para-phenylenediamine (PPD) concentration is not exceeding 4%, but they didn't mentioned exact concentration. The PPD at various concentration i.e., 0.3 - 7% can be fatal to the humans if consumed orally. The other toxic component of the hair dye was resorcinol, which is a corrosive and also causes renal toxicity. The patient however did not have any evidence of resorcinol poisoning. This study highlights the major toxicities of hair dye and also highlights the importance of a thorough review of the toxicology of all components of any ingested substance.

This study showed that Vasmol hair dye poisoning mortality had 5%. Deaths occurred by three main reasons, they are: Cardio respiratory failure, Myocarditis and Acute renal failure. The poisoning of PPD was not more common in this region previously. Previously cases of OP poisoning were more but due to the strict control of sale of OP, poisoning of hair dye (PPD) is more common these days. The controlled supervision over trading of hair dye is necessary to stop super Vasmol poisoning. This has to be reported to the concerned poisoning control authorities to make sure about the concentration of PPD in Super Vasmol 33. This will help in initiating appropriate treatment strategies.

We recommend that the selling of Vasmol hair dye containing PPD should be controlled and public education programme should be initiated in this regard, so that mortality from Vasmol poisoning may be prevented, because availability of Vasmol hair dye containing PPD in home causes easy accessibility of this poison. The community should be educated not to do such activities which endanger their life.

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