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A Prospective Study on Clinical Manifestations and Consequences of Super Vasmol Poisoning In a Tertiary Care Hospitalin Kadapa

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I. Background

Super vasmol hair dye poisoning is an emerging problem in the developing parts of the world mainly because of the easy availability and low cost of the substance.[1] The active ingredients of Super vasmol include Paraphenyldiamine, propylene glycol, liquid paraffin, resorcinol, cetostearyl alcohol, sodium lauryl sulfate, sodium ethylenediaminetetraacetic acid, preservatives, and perfumes[2]. The main compound responsible for the toxicity is paraphenyldiamine [$C_6H_4(NH_2)_2$], which is a key ingredient for most of the hair dyes, and it is used for colour enhancement.

AIM OF THE STUDY:
To study the clinical profile, biochemical profile, complications, management and outcome in super vasmol poisoning.

II. Materials And Methods

MATERIALS:
All patients admitted in the Intensive Medical Care Unit with history of supervasmol poisoning
Duration of study: 6 months June 2019 to November 2019
Type of study:prospective study
Sample size: 106
Inclusion criteria:
All patients admitted in the IMCU with history of supervasmol poisoning
Exclusion criteria:
History of multiple poisoning
Hair dye poisoning other than supervasmol

The following investigations were done to patients - complete blood count,differentialcount,RFT,LFT,serumelectrolytes,urinedeposits,CPK-TOTAL,ECG.

III. Observations And Results

TABLE 1 SEX DISTRIBUTION OF STUDY POPULATION

GENDER	NUMBER	PERCENTAGE
MALE	36	34
FEMALE	70	66
TOTAL	106	100

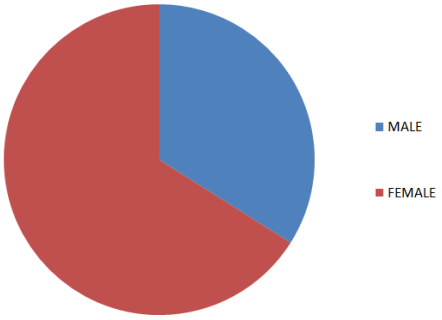


FIGURE 1 indicates sex distribution of study population

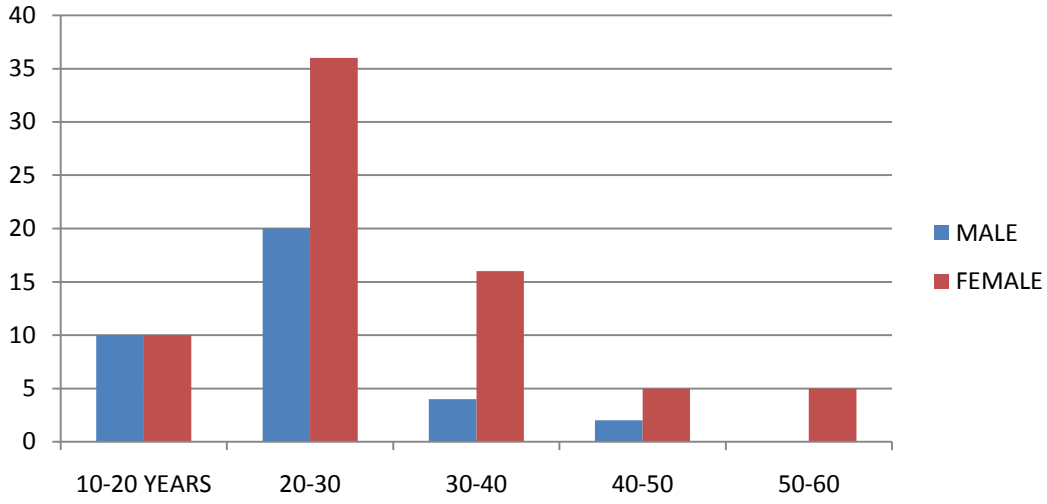
The pie chart shows the age sex distribution of the study population with females (66%) more than the males (34%).

AGE DISTRIBUTION FREQUENCY

TABLE 2

AGE	MALE	FEMALE	TOTAL	PERCENTAGE
10-20	10	10	20	18.8
20-30	20	36	56	52.8
30-40	4	16	20	18.8
40-50	2	3	5	4.7
50-60	0	5	5	4.7

FIGURE 2 AGE AND GENDER WISE FREQUENCY



The graph shows maximum percentage of cases between 30-40 years which constitutes 48.8% of the study population and least in 40-50 years 4.7% and 50-60 years 4.7% of the study population.Female preponderance was noted beyond 20 years of age whereas between age group 10-20 years males and females had equal incidence.

TABLE 3- VOLUME OF VASMOL CONSUMED

Volume	Frequency	Percentage
<50ml	54	50.9
>50ml	52	49.1

Supervasmol is available in bottles as a solution. The net volume of the dye in the bottle is either 50ml or 100ml. 100ml of supervasmol contains 12 grams of para-phenylene-diamine. The minimal dose of para-phenylene-diamine that has to be consumed to produce systemic features of poisoning is approximately 3 grams. The dose that is required to produce fatal toxicity after oral ingestion is 7grams or more.

This indicates that the consumption of more than 50ml of the hair dye is sufficient to produce significant local effects mainly edema of the face, neck, pharynx, larynx and the vocal cords thereby leading on to respiratory distress mainly due to the obstruction of the airway and systemic toxicity mainly rhabdomyolysis causing

deposition and clogging of the proximal renal tubules with myoglobin. This ultimately causes acute kidney injury due acute tubular necrosis.

TABLE 4-DISTRIBUTION OF CASES ACCORDING TO CLINICAL FEATURES

Signs/symptoms	Number of cases	Percentage
Dysphagia	72	67.9
Cervicofacial oedema	70	66
Change in voice	60	56.6
Stridor	50	47.1
Cola coloured urine	50	47.1
Myalgia	38	35.8
Oliguria	30	28.3
Calf tenderness	28	26.4
Dyspnoea	28	26.4
Tachypnoea	28	26.4
Seizures	26	24.5

In hair dyes Para-phenylene-diamine is usually mixed with hydrogen peroxide in the preparation of hair dyes which yields an intermediate called the Bandrowski's base. This compound is highly toxic and has allergic as well as mutagenic properties.

Angioneuroticoedema is the earliest manifestation following ingestion of the dye. It occurs as early as 1 to 2 hours from exposure. The main symptoms are dyspnoea and dysphagia. The signs include oedema involving the face, tongue, throat up to the larynx. This causes severe respiratory distress.

Dysphagia was the most common presentation found in 67.9% of cases followed by cervicofacial oedema 66%.

Para-phenylene-diamine attaches itself to the sarcoplasmic reticulum of the muscle thereby causing increased calcium release from them. So the intracellular calcium levels increase which causes sustained contraction of the muscle leading on to rhabdomyolysis. Once the muscle fibres goes for lysis the myoglobin which is present inside the muscle is released in to the blood. Myoglobin is a small molecule and has a molecular weight of 17kD. This molecule then gets deposited in the renal tubules leading on to acute tubular necrosis and ultimately acute kidney injury which manifests as cola coloured urine,myalgia,oliguria and calf tenderness.

Seizures were the least occurring in 24.5% of cases.Convulsions occur with acute intoxication of resorcinol and presents as generalized tonic-clonic seizures.

INVESTIGATIONS

TABLE 5

INVESTIGATION	NUMBER OF CASES	PERCENTAGE
Leucocytosis (>11,000)	76	71.6
Increased BUN (>20mg/dl) and creatinine (>1.5mg/dl)	50	47.1
Urine deposits	50	47.1
ECG Changes-sinus tachycardia	50	47.1
Neutrophilia	46	43.4
Hyperkalemia	38	35.8
CPK-Total	38	35.8
Hypocalcemia	30	28.3
Lymphocytosis	16	15.1
Hyperacute T waves	16	15.1
Eosinophilia	4	3.7

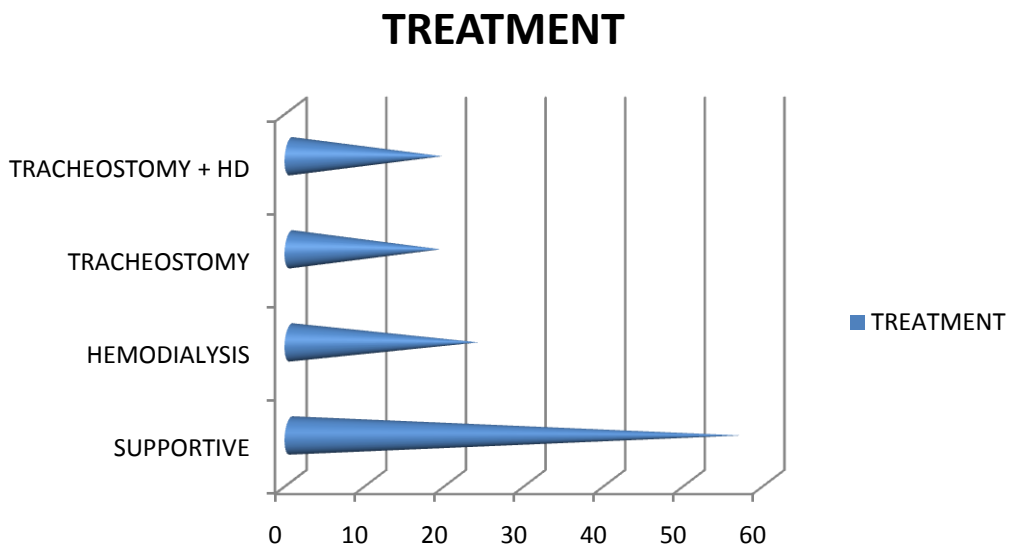
Leucocytosis was seen in 71.6% of cases. Increased BUN and creatinine was seen in 47.1% of cases.Urine deposits were present in 47.1% of cases.Hyperkalemia was noted in 35.8% of cases. Hypocalcemia was present in 28.3% of cases.Sinus tachycardia was the most common ECG abnormality seen in 47.1% of cases followed by hyeracute T waves seen in 15.1% of cases.

TREATMENT

TABLE 6

TREATMENT GIVEN	NO.OF CASES	PERCENTAGE
SUPPORTIVE	60	56.6
HEMODIALYISIS	25	23.6
TRACHEOSTOMY	10	9.4
HD +TRACHEOSTOMY	11	9.5

FIGURE 3 – TREATMENT GIVEN



Majority of patients(56.6%) required supportive treatment with antihistamines,steroids,oxygen support and forced alkaline diuresis with sodium bicarbonate.

This is done by initial infusion with normal saline over one hour followed by sodium bicarbonate infusion in 5% dextrose solution which is made to run over an hour and then potassium replacement is done with intravenous infusion of potassium chloride over an hour. This each 3 hour cycle is repeated till the urine colour returns back to normal. While doing this the patients are constantly monitored for urine output which must be more than 4-6ml/kg/hr. if this is not achieved patients are given intravenous loop diuretic i.e., frusemide 20mg iv bolus and then monitored for urine output. If there is no improvement of urine output then diuresis has to be stopped immediately.

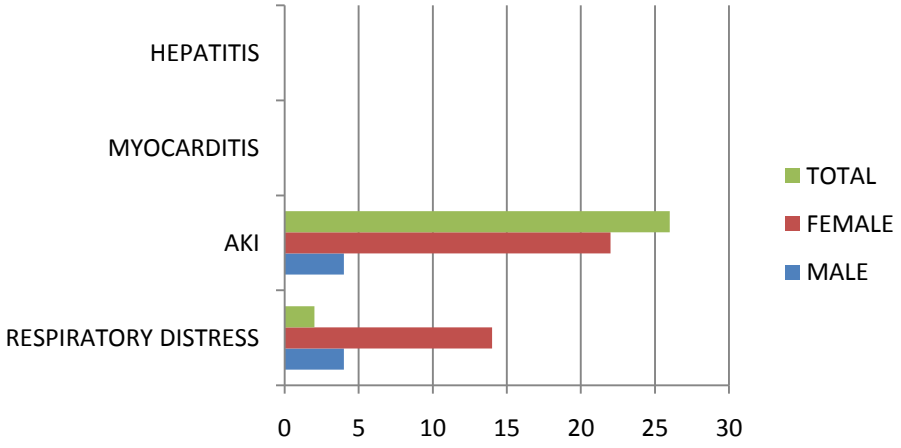
23.6% underwent renal replacement therapy alone while 9.4% underwent emergency tracheostomy alone.9.5% of patients required both tracheostomy and hemodialysis.

COMPLICATIONS

TABLE 7

COMPLICATION	MALE	FEMALE	TOTAL
Respiratory Distress	4(3.7%)	14(13.2%)	18(16.9%)
AKI	4(3.7%)	22(38%)	26(24.5%)
Myocarditis	0	0	0
Hepatitis	0	0	0

FIGURE 4



Out of the 106 patients admitted 18 patients (16.9%) developed respiratory distress and 26 patients (24.5%) developed acute kidney injury.7.6% of them being males and 33.8% of them being females

OUTCOME

OUTCOME	MALE	FEMALE	TOTAL
RECOVERED	34	60	94
EXPIRED	2	10	12

Out of the total 106 patients admitted 94 patients recovered completely and 12 patients expired.

IV. Results:

We conducted a prospective study on 106 patients who were admitted in the intensive medical care unit of our hospital. Female predominance was seen. The commonest presentation was shortness of breath with cervicofacialoedema followed by myalgia. The presence of rhabdomyolysis was evident from the muscle pain, tenderness and elevated total CPK levels. 42 patients developed complications like respiratory distress and acute kidney injury. None of the individuals in the study population developed hepatitis and myocarditis. 23.6% of the patients required hemodialysis, 18.8% needed tracheostomy and 19% were subjected to both hemodialysis and tracheostomy. The mortality rate in the study population was 11%. Patients were treated with supportive treatment mainly with steroids, antihistaminesand supplemental oxygen. Patients who had evidence of rhabdomyolysis were treated with forced alkaline diuresis. Totally 12 patients expired and the cause of death being respiratory distress and acute kidney injury.

V. Conclusion:

Supervasmol is an emerging alternative to organophosphorus poisoning because of its easy availability and low cost.There is no specific antidote for supervasmol poisoning and treatment is supportive. Toxicity is dose dependant with increased morbidity and mortality. Clinical outcomes rely on early recognition, prompt referral, and aggressive supportive treatment in collaboration with different specialties. Health authorities should call for the prevention of the use supervasmol in the market.

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