



ORIGINAL RESEARCH PAPER

Medicine

A STUDY ON CLINICAL PROFILE AND OUTCOME IN HAIR DYE POISONING

KEY WORDS: supervasmol, para-phenylene-diamine, acute kidney injury.

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ABSTRACT

BACKGROUND:

The active ingredients in the hairdye which has toxic effects are para-phenylene-diamine, resorcinol, propylene glycol and EDTA sodium. Para-phenylene-diamine is responsible for most of the clinical features of toxicity.

AIM OF THE STUDY:

To study the clinical and biochemical profile, complications, and outcome in hair dye poisoning.

METHODS:

A prospective descriptive study done on 53 patients over a period of one year

RESULTS:

We conducted a prospective study on 53 patients who were admitted in the intensive care unit of our hospital. Female predominance was seen. 21 patients developed complications like respiratory distress and acute kidney injury. 5 of the individuals developed hepatitis. 13.2% of the patients required hemodialysis, 5.7% needed tracheostomy and 11.3% were subjected to both hemodialysis and tracheostomy. The mortality rate in the study population was 11.3%.

CONCLUSION:

The initial presentation, volume consumed and biochemical profile correlates directly with severity of the clinical features and the complications. The main complications were respiratory distress and acute kidney injury.

INTRODUCTION

Ingestion of hair dye, is in trend as a major source of suicidal poisoning following pesticides because of its easy availability and low cost. The active ingredients in the dye which has toxic effects are para-phenylene-diamine, resorcinol, propylene glycol and EDTA sodium. Para-phenylene-diamine is responsible for most of the clinical features of the patients presenting with hair dye poisoning. when ingested, it causes acute angioedema of Face and neck rhabdomyolysis and acute renal failure¹⁻⁶. PPD ingestion causes symptoms arising from involvement of different organs. The purpose of the study is to document our experience on clinical presentation, laboratory findings, and outcomes of hair dye poisoning in a rural part of south Tamilnadu.

METHODS

This prospective descriptive study was done on 53 patients over a period of one year with patients getting admitted with supervasmol poisoning in intensive care unit of Tirunelveli Medical college Hospital a tertiary care centre in south Tamilnadu. Patients with mixed poisoning and hair dye poisoning other than supervasmol poison are excluded from the study. Demographic profile (age, gender, and socioeconomic status), volume consumed, time to hospitalization, clinical presentation, laboratory findings, treatment details and outcomes were analysed. Data obtained from this study were analyzed by using the statistical package for social science software (SSPS v. 13). A value of 0.05 was considered the value of statistical significance for all statistical tests in the present study. Institutional Ethics Committee approved the study protocol for publishing the results.

RESULTS

The characteristics of the studied population were shown in Table (1). Majority of the admitted patients were females accounting for 66% (35 patients) with males being 34%. The age group of the study population was predominantly less than 30 years of age accounting for 77% (41 patients). Mean age 20.8 ± 5.6 yrs. Out of the 53 patients, 26 patients (49.1%) consumed more than 50 ml and 27 patients (50.9%) consumed less than 50ml.

Table 1 (Age, gender distribution of population)

Age Group	Gender		Total
	Male	Female	
12-15	0	3	3(5.6%)

16-30	11	27	38(71.7%)
>30	7	5	12(22.7%)
	18(34%)	35(66%)	53(100%)

mean volume consumed 51.2 ± 28.4 (25-100) mL, and mean time to hospitalization was 8.9 ± 10.9 (1-72) hrs.

The classical features of hair dye poisoning such as cervicofacial edema with the hard protruding tongue was observed in 35(66%); Dark urine was observed in 25 (47.2%) and hepatitis in 16 (30%) at presentation. During the hospital stay, 4 (7.5%) required ventilatory support for airway compromise; among them, two patients died due to respiratory failure.

Table 2. Symptoms and morbidity, outcome at admission

Clinical features	Number	Percentage
Cervicofacial edema	35	66.1
Dyspnea	36	67.9
Muscle pain	19	35.8
Dark urine	25	47.2
Seizures	1	1.9
Acidosis	14	26.4
Hepatitis	16	30
Ventilator	4	7.5
ARF	13	24.5
Dialysis	7	13.2
Tracheostomy	13	24.5
Mortality	4	7.5

Table 3 Laboratory parameters at admission.

	Mean ± SD	Median and Range
TLC(1000 cells/mm ³)	15.7 ± 5.56	14 (7- 24)
S.creatinine(mg/dl)	1.25± 0.98	1.1 (0.7-11.0)
SGOT(U/L)	138±94	78 (38-2648)
SGPT(U/L)	164 ±102	74 (34-1986)
CPK (U/L in 1000)	25.43 ± 20.36	22.4(2-64)

The mean ICU stay was 6.35 ± 4.19 days (1–14). The duration of ventilator support was 6.19 ± 4.19 days (1–13). In a group of 4 patients with ventilator support, time to normalization of liver enzymes was found to be 8.75 ± 1.98 days. 7 patients (13.2%) developed ARF after 72 hours of poisoning and recovered with hemodialysis.

We evaluate the features and outcome based on quantum of hair dye consumed. It can be noticed from Table 4 that the proportion of patients who had cervicofacial edema was apparently similar in both groups. All patients who ingested more than 50mL of poison had difficulty in mouth opening, and 4 patients out of this group required ventilator support. There are significant differences in the clinical profiles laboratory markers such as markers of leucocytosis (TLC), rhabdomyolysis (CPK), and hepatitis (SGOT, SGPT and ALP) between patients who consumed fewer volumes and those who consumed larger volumes. The length of ICU stay was significantly more in patients who consumed more volume (6.19 ± 4.19 days versus 2.08 ± 0.96 days, $P < 0.0001$).

Table 4 Clinical features and outcomes based on volume consumed.

Volume	<50mL (N = 26)	≥50mL (N = 27)	P-Value
Cervicofacial edema	9	26	0.8
Dyspnea	10	26	0.003
Muscle pain	4	15	0.002
Dark urine	5	20	0.001
Seizures	0	1	0.4
Acidosis	2	12	0.001
Hepatitis	2	14	0.000
Ventilator	0	4	0.024
ARF	3	10	0.002
Dialysis	1	6	0.001
Tracheostomy	1	12	0.000
Mortality	0	4	0.29
TLC(1000 cells/mm ³)	10.8 ± 2.1	16.4 ± 1.8	0.005
S.creatinine(mg/dl)	0.78 ± 0.19	1.65 ± 2.64	0.03
SGOT(U/L)	58.15 ± 38.9	1397.19 ± 1312.18	0.001
SGPT(U/L)	56.8 ± 48.9	188 ± 98.6	0.001
CPK (U/L in 1000)	14.13 ± 3.28	15.65 ± 12.42	0.24
Time to admission (Hr)	8.10 ± 7.55	10.10 ± 14.75	0.29
ICU stay (Days)	2.08 ± 0.96	6.42 ± 4.75	0.000

Out of the 53 patients admitted 9 patients (16.9 %) developed respiratory distress and 13 patients (24.5%) developed acute kidney injury. Out of the total 53 patients admitted 49 patients recovered completely and 4 patients expired. 92.5 % of the total study population recovered completely and the mortality rate was 7.5 % in this study.

DISCUSSION

Hair dye poisoning has been increasing in incidence over the past 10 -20 years. One of the prime reasons for this is the easy availability of these hair dyes and the cheaper cost. The commonly used hair dye with suicidal intent is super vasmol. The active component of this being para-phenylene-dimine. The other constituents which have been studied to have toxic effects are resorcinol and propylene glycol. EDTA sodium which is also a ingredient in this hair dye causes hypocalcemia but at a higher doses. The fatal dose varies for each of the component. The most toxic compound of super vasmol is para-phenylene-diamine followed by resorcinol, propylene glycol and lastly EDTA sodium. The toxic effects of PPD is 3 grams and fatal dose of PPD is anything

above 7 grams. 50 ml of super vasmol contains 6 grams of PPD and so the mortality rate increases with consumption of more than 50 ml of the dye. In this study 53 patients were studied prospectively who were admitted in the intensive medical care unit of our hospital. The study was mainly focused on the clinical profile, complications, treatment and outcome of these patients. Majority of the admitted patients were females accounting for 66 % (35 patients) (table.1) with males being 34%. The age group of the study population was predominantly less than 30 years of age accounting for 77% (41 patients) which is similar to the study done by Kallei9 et al where the mean age was 26.2 ± 9.1 years. The common presenting features were dysphagia (67.9%), myalgia (35.8%) and dyspnoea (26.4%). On examination 66.1% of the patients had cervicofacial edema, 26.4% were tachypnoeic and 35.8% of the patients had calf muscle tenderness. 47.2% (25 patients) had cola colored urine. 49.1% (26 patients) had leucocytosis. The complications these patients developed are acute respiratory distress (16.9%) and acute kidney injury (24.5%). Most of the patients had normal ECG. 24.5% (13 patients) had sinus tachycardia followed by T wave abnormalities in 7.5%. Total of 13 patients in respiratory distress required tracheostomy. 13 other patients (24.5%) developed acute kidney injury and hemodialysis was done. 16 of the patients(30%) developed hepatitis. Myocarditis was not reported in our study. 92.5% (49 patients) recovered completely with supportive treatment, tracheostomy and hemodialysis while 4 patients expired (7.5%). Out of this, patients 3 patients had both respiratory distress and acute kidney injury while the other patient had respiratory distress and this patient expired on table while tracheostomy was being done.

All the patients admitted were treated with supportive measures mainly gastric lavage, supplemental oxygen, intravenous fluids, intravenous corticosteroids mainly hydrocortisone, intravenous anti-histaminic and antibiotics. 69.8% of the patients including both males and females recovered with supportive treatment alone. All the patients who developed myalgia, muscle tenderness, elevated muscle enzymes and cola coloured urine were treated with forced alkaline diuresis to prevent progression to acute tubular necrosis secondary to myoglobinuria. 13.2% of the patients required hemodialysis, 24.5 % needed tracheostomy and 11.3% were subjected to both hemodialysis and tracheostomy. The mortality rate in the study population was 11.3% which was because of late presentation, large volume of ingestion and poor neurological status on presentation.

Our study has very well documented the hepatotoxicity, nephrotoxicity, and cardiotoxicity of hair dye poisoning. However, the limitation of our study is the small subject population.

CONCLUSION

Hair dye poisoning in India is a rapidly emerging type of suicidal poisoning. The incidence has increased over the past few years. Super vasmol poisoning is a dye which is commonly used due to its easy availability. The common presenting symptoms are cervicofacial edema, and muscle tenderness. The common complications are respiratory distress, acute kidney injury, myocarditis and hepatitis. In our study we did not come across any patient with cardiac and hepatic involvement. Early treatment with activated charcoal, supportive measures and forced alkaline diuresis reduces the development of complications like acute kidney injury. So, early intervention reduced the mortality rate in patients with super vasmol poisoning.

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