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Original Article

Clinical Profile of Ingestional Hair Dye Poisoning: A Prospective Study

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Abstract

Introduction: Ingestional hair dye poisoning is emerging as leading cause of self-harm in households. paraphenylenediamine (PPD) poisoning has protean manifestations, which have been studied here.

Aim: The aim of this study was to evaluate the clinical profile of ingestional hair dye poisoning.

Materials and Methods: A prospective cross-sectional observational study in patients admitted with a history of hair dye ingestion with classical symptoms of neck swelling, muscle pain, and dark-colored urine.

Results: About 82.60% of the patients had angioedema involving the lips, neck, tongue, sublingual structures, and pharynx. 80.43% of patients had discoloration of urine to brownish-black color. Muscle pain, swelling is seen in 80.43% of the individuals.

Conclusion: Early hospitalization, identification, and appropriate treatment ensure good outcome in PPD ingestional poisoning cases.

Key words: Cervicofacial edema, Hair dye poisoning, Mortality, paraphenylenediamine poisoning

INTRODUCTION

The overall suicide rate due to self-poisoning was about 31% in South India.[1] The highest rates of poisoning were due to household agents, drugs, insecticides, chemicals, animal, or reptile bites in the descending order of frequency.[2] Among the household articles used for self-harm, drugs (prescribed for other medical or surgical conditions for self or for others) and chemicals (lavatory cleaners and hair dye) are noteworthy. Permanent hair coloring is done by the use of oxidation dyes. These are composed of paraphenylenediamine, a coupling agent, and an oxidant. Oxidizing agents are primarily hydrogen peroxide. Coupling agents are usually derivatives of aniline. The mechanism of coloring of hair involves three steps, i.e., oxidation of p-phenylenediamine derivative to the quinine state, reaction of the resultant compound with a coupler, and oxidation of the resulting compound to the final dye.[3] The characteristic features of paraphenylenediamine poisoning, namely, rhabdomyolysis and airway edema are characteristically absent in pure propylene glycol poisoning.[4] In the absence of specific antidote and the relative easy availability of the component, a high index of suspicion, early preventive measures is required for a good outcome. Systemic toxicity may occur due to suicide, accident, or homicide. It is also used as an abortifacient. Skin and eye contact causes skin irritation, contact dermatitis, lacrimation, and chemosis. It may also cause exophthalmos or even permanent blindness due to the local contact. The lethal dose is estimated to be 7-10 g in various studies.[5]

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Aim

The aim of this study was to evaluate the clinical profile of ingestional hair dye poisoning.

MATERIALS AND METHODS

A prospective cross-sectional observational study conducted in the Government Rajaji Hospital, Madurai,

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Tamil Nadu. The Institutional Ethics Committee approval and informed consent from the patients/relatives were obtained. Patients admitted with a history of hair dye ingestion with classical symptoms of neck swelling, muscle pain, and dark-colored urine were included in the study. Demographic details include age, gender, education, and occupation of the individual. Clinical details include cervicofacial edema, limb pain and swelling, discolored urine, oliguria, dyspnea, palpitation, syncope, voice change, pulse and blood pressure data, and oxygen saturation recorded in the bedside using a finger pulse oximeter. Laboratory data to be collected include urine analysis for protein, deposits; blood total count, blood urea, creatinine, sugar, serum sodium, potassium, serum total creatinine kinase (CPK), serum glutamic oxaloacetic transaminase, serum glutamic pyruvic transaminase, electrocardiogram (ECG), and serum cardiac troponin T for patients, in whom there are ECG changes and/or symptoms and signs of myocarditis such as tachypnea, tachycardia, and hypotension. Treatment details to be collected include airway management requiring tracheostomy or endotracheal intubation, ventilatory support, dose, duration, and type of steroids used, whether alkaline diuresis used, dialysis details if done, the use of vasopressor, antiarrhythmics, or cardioversion. Cervicofacial edema discolored urine, muscle pain and swelling were noted in the first 24 h of admission. Oliguria, dyspnea, palpitation, syncope, seizures, etc. were taken into consideration when present any time during the hospital stay. Urinalysis, blood urea, creatinine, serum electrolytes, and serum CPK were taken on admission, the 2nd day and periodically once in 1 or 2 days thereafter. The 2nd-3rd day values and discharge day values are taken into consideration for the study. ECG was taken for all patients during admission, and thereafter, only if the patient has persistent tachycardia, electrolyte abnormalities, hypotension, dyspnea, tachypnea, and chest pain. If ECG changes were present, cardiac troponin T was done.

Table 1: Age distribution

Age group (years)	Male	Female	Total	Percentage
15-25	4	18	22	47.8
26-35	10	6	16	34.7
36-45	1	4	5	10.8
>45	1	2	3	6.5
Total	16	30	46	100

Table 2: Clinical profile of study patients *n*=46

Symptoms/sign	Number of cases	Percentage
Cervicofacial edema	38	82.60
Muscle pain and/or swelling	37	80.43
Brown black-colored urine	37	80.43
Oliguria	32	69.56
Tachypnea, dyspnea	5	10.86
Hypotension	7	15.21
Seizures	1	2.17

RESULTS

About 52 patients admitted with hair dye ingestional poisoning were included; 46 patients were included in the study.

The majority of the patients were females, comprising almost two-thirds of the cases. In both genders, the 15-35 years age group comprised more than 80% of the total number of patients (Table 1).

About 82.60% of the patients had angioedema involving the lips, neck, tongue, sublingual structures, and pharynx. 80.43% of patients had discoloration of urine to brownish-black color. Muscle pain, swelling is seen in 80.43% of the individuals (Table 2). Proteinuria was found in 20 patients (43.47%); Serum creatinine was elevated in 27 patients (58.69%), out of whom, only 9 patients required dialysis, other 18 patients recovered with fluid management and alkalizing management of urine. Serum CPK levels were elevated in 36 patients (78%), which gradually decreased in the majority of patients with the establishment of normovolemic status with fluids management and forced alkaline diuresis. 6 patients had ECG changes such as tachycardia and non-specific ST/T changes, of which, 1 patient had elevated cardiac troponin. All patients were treated with steroids; out of 38 patients who had edema of the face, neck, tongue, pharynx and only 20 patients required tracheostomy. 2 patients were required mechanical ventilation. 6 out of 46 patients (13.05%) were expired. The duration of hospital stay was directly proportional to the complications and interventions. The average duration of stay was 5-7 days for those who were managed totally conservatively for airway edema, renal failure, etc. For those who had tracheostomy, and without hemodialysis for elevated renal parameters, the duration of stay was 7-10 days. For those who had renal failure and on hemodialysis, 2-3 weeks stay was required to recover from the illness.

DISCUSSION

Since there is no antidote, early recognition of the condition along with institution of early treatment is very important to ensure a good outcome. In our study, 93.4% of individuals consumed the hair dye with an intention of self-harm. Only

a meager percentage consumed it accidentally. This rate was consistent with the findings of Jain *et al.*[6] (97.84%), in a study comprising a large number of patients in North India. All those who consumed it accidentally recovered since they may have stopped consuming the product on the recognition that they are consuming an unpalatable thing. These patients recovered with conservative measures. Regarding the age group, 15-35 years age group comprised nearly 80% of the total number of patients, which is consistent with the findings of Jain *et al.*[6] and Kondle *et al.*[7] The majority of patients were females 66% in our study which is also consistent with the findings of various studies done in India. Cervicofacial edema was present in the majority (80%) of the patients in our study which is consistent with the findings of Jain *et al.*[6] (73%), Kondle *et al.*[7] (88%), and Suliman *et al.* (100%).[8] Urinary discoloration was present in 80% of patients in our study; it was present in 94% and 47%, respectively, in studies conducted by Kondle *et al.*[7] and Jain *et al.*,[6] respectively. Oliguria was present in 69% in our study; oliguria was present in 100% cases in the study by Sahay *et al.*[9] and 25% in Jain *et al.*[6] study. Serum creatinine was elevated in 58.69% patients in our study. Serum CPK was elevated in 78.2% in our study, and it was 58.3% in Jain *et al.* study.[6] Steroids were started for all patients on admission and given for 5 days for those with moderate to severe angioedema. Only 52.63% of patients who had airway edema required tracheostomy. Among the patients who had elevated serum creatinine, only nine (33.33%) of them required dialysis Jain *et al.* study.[6] The mortality rate was almost similar in males and females in our study (12.5% and 16.67%, respectively). Overall mortality was 13.05% in our study and 22.48% in Jain *et al.*[6] study; mortality rate was lower among patients who received methyl prednisolone (14.02%) compared to hydrocortisone (27.7%) in that study.

CONCLUSION

Hair dye is ubiquitous in households; nowadays, it is a potential mode of self-harm whether intentional or accidental. Patients with cervicofacila edema which is a potentially life threatening complication can be saved by early identification and appropriate treatment. Rhabdomyolysis manifesting as muscle pain and tenderness with subsequent renal failure can be managed effectively with adequate hydration and alkalinizing the urine. Patients presenting early to the hospital have a good outcome with appropriate treatment.

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