Hair Dye Poisoning at Otolaryngology–Head and Neck Surgery of Khartoum Teaching Hospital, Sudan, 2002-2007

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Background: Hair dye poisoning is the major cause of intoxication in developing countries with high morbidity and mortality rates among the patients. The present study was conducted to determine the clinical presentation, complications and the case fatality rate of hair dye poisoning patients at OHNS (Otolaryngology–Head and Neck Surgery) of Khartoum teaching hospital in Sudan. Methods: This was a five-year retrospective study, which was conducted at OHNS of Khartoum Teaching Hospital in Sudan from 2002 to 2007. Data were retrieved from patients’ notes kept in the Medical Record Department through a well-designed data sheet. Results: A total of 80 cases was studied. Females predominated in relation to male (92.5% and 7.5%, respectively) who ingested hair dye. The majority of patients were between 21-40 years of age. The victims commonly presented with angioneurotic edema, for which an emergency tracheostomy was done for all patients. Acute renal failure and arrhythmia were the most commonly reported complications of hair dye poisoning. Hair dye poisoning complications were the main cause of deaths among the patients, leading to a case fatality rate of 5%.

Conclusion: Hair dye poisoning leading to angioneurotic edema was the most common emergency clinical presentation in our hospital especially among female. Emergency tracheostomy is needed for almost all patients with hair dye intoxication. Case fatality rate among hair dye intoxication victims was high. Trade authorities should restrict Hair-dye in the local markets and healthy alternatives should be promoted for female cosmetic practice. Health authorities should invest more in training of all doctors in the emergency management of hair dye poisoning and its complications.

Keywords: OHNS (Otolaryngology–Head and Neck Surgery), Hair Dye Poisoning, Intoxication, Angioneurotic Edema, Indications, Complications and Case Fatality Rate.

INTRODUCTION

Hair dye poisoning has been emerging as an important cause of intentional self-harm in the developing world.1 Case series from Khartoum and Casablanca had been reported 46 cases of hair dye poisoning. Hair dye poisoning was the number one cause of poisoning in Morocco during the 1990s. Numerous case reports have been reported from India.1 Mortality rates vary between 0.03% and 60%. 1

Hair dyes contain paraphenylene-diamine (PPD) and other chemicals that can cause rhabdomyolysis, laryngeal edema, severe metabolic acidosis and acute renal failure. 2 Clinical features of the hair dye poisoning include,
cervicofacial edema (79%), chocolate brown colored urine (74%), upper airway tract edema, (79%) oliguria (36.8%), muscular edema (26.3%), shock (26.3%), rhabdomyolysis, metabolic acidosis, acute renal failure (47.3%) and hyperkalemia (28.3%). 3. Rhabdomyolysis and acute renal failure were main causes of mortality (21%).

PPD is highly toxic.4 Interventions at the right time had been shown to improve the outcome and the hair dye ingestion is considered as a medical emergency.1 Cases who consumed up to 10 gm. of PPD usually survived if they are presented to hospital within four hours of dye ingestion in whom proper management can be delivered in the form of intravenous methyl prednisolone and other supportive care.4 The emergency measures should also include gastric lavage and patients should be monitored for respiratory distress and endotracheal intubation has to be performed early if laryngeal edema developed. Metabolic acidosis should be corrected. Early intervention with half normal saline and soda bicarbonate infusion has been shown to be beneficial in rhabdomyolysis and renal dialysis and continuous renal replacement therapy have been found to be useful in acute renal failure.1 All patients could recovered renal function after a mean period of 15 days of dialysis as per Suliman et al.4 Severe edema of face, neck and floor of mouth, renal failure and myocarditis were poor prognostic complications.5

Although, hair dye is a major cause of poisoning and intoxication in Sudan with high morbidity and mortality rate among the intoxicated victims, still there is little information in our local setting regarding the subjects. A retrospective study to reflect our five-year experience with the aim; to determine the clinical presentation, complications and the case fatality rate of hair dye poisoning was of high importance, especially those targeting patients in the biggest referral OHNS (Otolaryngology–Head and Neck Surgery) setting; thus, more studies were needed to provide evidence based data to health authorities to assist in the design of appropriate strategies in dealing with hair dye poisoning in the study areas.

METHODS

Ethical Statement

Ethical clearance was obtained from OHNS Khartoum Teaching Hospital, Federal Ministry of Health, Sudan.

Study Design

A retrospective review of patients’ files that had a hair dye intoxication at Khartoum Teaching Hospital during the five-year period between 2002 to 2007 was carried out.

Study Site

OHNS Khartoum Teaching Hospital is the biggest one of the five-tertiary and referral hospitals in the country and has a bed capacity of 300. It is also a teaching hospital for the Faculty of Medicine Khartoum University. Khartoum is the capital of Sudan, it consists of three cities, Khartoum, Khartoum Bahary and Omdurman.

Study Subjects

The study included all patients who presented with hair dye poisoning at OHNS Khartoum Teaching Hospital during the study period. Patients who had incomplete or missed basic information were excluded from the study. Data were retrieved from patient registers kept in the Medical record departments and entered in a preformed checklist before analysis. The checklist included: personal data (age, gender and residence), clinical presentation, the need for tracheotomy, complications, if any, and mortality and its cause.

STATISTICAL ANALYSIS

The statistical analysis was performed using statistical package for social sciences (SPSS) version 16.0. Proportions and frequency tables were used to summarize categorical variables. Continuous variables were categorized.

RESULTS

The total number of both genders was 80 cases. Females predominated in relation to males who ingested hair dye (PPD). 74 of them were females (92.5%) and 6 were males (7.5%) (Table.1). Their ages ranged between (21-40) years. Most of them come from Khartoum State and central part of Sudan (88.8%).

The clinical presentation was angioneurotic edema in all cases leading to the tongue, sublingual and submandibular edema and black colored urine. Other systemic manifestations observed which were: signs of renal failure, muscle pain, limbs paralysis, ventricular arrhythmia, convulsions, coma and respiratory failure (Table.2). Urine analysis for hair dye was done for all patients and it was found positive in 50 patients (62.5%) and negative in 30 patients (37.5%) (Table.3).

Emergency tracheotomies were performed for all patients. The most common indication for tracheostomy in patients with Hair dye poisoning was angioneurotic edema, which occurred in 63.7% of patients. Most of the complications were as follows: Three female patients complicated by acute renal failure and one male complicated by sudden arrhythmia; All patients who developed these complications were died. The case fatality rate among patients with Hair dye poisoning in this study was 5%. Insignificant complications related to tracheotomy were reported like tube blockage and surgical emphysema.

DISCUSSION

Females were more affected than males by ingestion of hair dye (paraphenylene diamine), this result was consistent with Elgamel et aI6 study in Sudan, which found that 80.5% of hair dye intoxication patients were females and 19.5% were males. A study done in Northern India by Jain P K et aI5 showed that the hair dye poisoning was more common among females (74.86%). Another study done by Radhika et al also showed there was a female predominance (65%).7 This is because females are
subjected and exposed to PPD more than males in Sudan due to the cosmetic use of hair dyes to enhance the blacking of hair and skin with henna.

In addition to, hair dyes are cheaply and easily available in local markets in Sudan, people are more accessible to those products. This intoxication usually occurs as a suicidal and/or accidental. Hair dye intoxication patients’ age ranged between (21-40) years. This result was consistent with Radhika et al finding, which showed that maximum incidence of hair dye intoxication was observed in the 2nd and 3rd decades. 7 Another study found that most of the hair dye poisoning cases (67.6%) were between 21-35 years of ages as per Mary N S and Ganesh R.8 This may be because of the high tendency of suicidal attempts among this age group especially female, which may be due to high stress during this age.

In this study, most of the patients developed angioneurotic edema in addition to other systemic manifestations like signs of renal failure, muscle pain, limb paralysis, ventricular arrhythmia, convulsions, coma and respiratory failure. The same results showed by Elgamel et al6 who showed that there was impairment of renal function test using urea and creatinine and those who developed renal failure were 20.5% of the intoxicated patients. Elgamel study also showed that the most common presentations were ingestion of dye (85.5%), tachycardia in (58%), tachynea in (31.5%), vomiting in (31%), angioneuratic edema in (22.5%), abdominal pain (22%), enlarge tongue (18%), facial edema (14%) and loin pain in (7%) of the cases.

A Rammurthy et al9 reported a case of suicidal ingestion of hair dye in India, which presented with angioneurotic edema, rhabdomyolysis and acute renal failure. Another case report presented a patient with respiratory distress due to laryngeal edema and later developed trismus and carpopedal spasm as per Bhargava P et al.10 Hair dye poisoning leads to angioneurotic edema and upper airway obstruction, a known major health hazard and an important cause of death in our hospital. In all patients with hair dye poisoning, an emergency tracheostomy was performed. This finding agreed with what was mentioned by Yagi11 in a study done in Sudan who showed that all patients underwent emergency tracheostomy because of severe strider as a late presentation and the vague symptom of voice change.

The main complications of hair dye poisoning in this study were acute renal failure and arrhythmia with high case fatality rate. Elgamel et al6 showed that the complications were respiratory distress in (22.5%), acute renal failure in (20.5%), cardiac problem in (1%) and liver problem in (0.5%). The medical treatment and emergency tracheostomy tend to decrease the mortality rate to only (3.5%). 6 An uncommon manifestation of hair dye poisoning was shown in a 16-year-old male from India, who presented with features of facial puffiness but normal respiratory parameters. His recorded Electrocardiograms (ECGs) revealed Right Bundle Branch Block (RBBB), supraventricular, ventricular extrasystole and ventricular tachycardia. Elevated Creatine Kinase-Myocardial Band (CPK-MB) and positive Cardiac-troponin-T confirmed the myocardial damage.

This patient died following cardiac arrest.12 A report of two cases of right sided pneumothorax in hair dye poisoning was shown by Senthilkumaran S.13 The available animal carcinogenicity data on hair dye components was reviewed as per Van Duuren BL. 14 From this review it became clear that certain hair dye components, some of which are still in hair dye formulations now on the market, are animal carcinogens. The compounds of concern that are still in use are: 3-amino-4-methoxyaniline, 2-nitro-4-aminobenzene, 3-nitro-4-hydroxyaniline.

LIMITATION OF THE THE STUDY

The potential limitation of this study was that, the study was a retrospective one. Also, the study was from a single center and the fact that information about some patients was incomplete in view of the retrospective nature of the study might have introduced some bias in our findings. A similar study in a prospective setting is highly recommended in order to describe our experiences of hair dye poisoning not only in our center but also worldwide.

CONCLUSION

Poisoning with hair dye leading to angioneurotic edema still remains the most common presentation in our setting. Hair dye poisoning was mainly among females in the third and fourth decades. The commonest clinical manifestation was angioneurotic edema, which necessitate emergency tracheostomy as a life saving procedure. The most common hair dye poisoning complications reported in this study was acute renal failure and arrhythmia. The case fatality rate among patients with hair dye poisoning was 5% and the cause of deaths was due to the complications. Trade authorities should prohibit hair dyes from the local markets and promote healthy alternatives for cosmetic and body decoration when using Henna. Health authorities should conduct more workshops for training of all doctors in the emergency management of hair dye intoxication (especially for the emergency tracheostomy) and it is complications, which might decrease the rates of mortality among the patients.

FUNDING SOURCE

None.

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COMPETING INTERESTS

The author declares that he has no competing interests.

ANNEXES

Annexes.1: Tables:

Table 1: Shows the numbers and percentage distribution of patients with hair dye poisoning by their gender in Khartoum Otolaryngology–Head and Neck Surgery Teaching Hospital, Sudan, 2002-2007. (N=80)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number of Patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>74</td>
<td>92.5</td>
</tr>
<tr>
<td>Male</td>
<td>6</td>
<td>7.5</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2: Shows the numbers and percentage distribution of patients with hair dye poisoning by their clinical manifestations in Khartoum Otolaryngology–Head and Neck Surgery Teaching Hospital, Sudan, 2002-2007. (N=80)

<table>
<thead>
<tr>
<th>Clinical manifestations</th>
<th>Number of Patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angioneurotic edema</td>
<td>80</td>
<td>100%</td>
</tr>
<tr>
<td>Renal failure</td>
<td>13</td>
<td>16.20%</td>
</tr>
<tr>
<td>Respiratory Failure</td>
<td>7</td>
<td>8.70%</td>
</tr>
<tr>
<td>Convulsion</td>
<td>4</td>
<td>5%</td>
</tr>
<tr>
<td>Coma</td>
<td>2</td>
<td>2.50%</td>
</tr>
<tr>
<td>Muscle pain</td>
<td>2</td>
<td>2.50%</td>
</tr>
<tr>
<td>Limbs paralysis</td>
<td>1</td>
<td>1.20%</td>
</tr>
</tbody>
</table>
Table 3: Shows the numbers and percentage distribution of patients with hair dye poisoning by result of urine analysis for PPD in Khartoum Otolaryngology–Head and Neck Surgery Teaching Hospital, Sudan, 2002-2007. (N=80)

<table>
<thead>
<tr>
<th>Result of urine analysis for PPD</th>
<th>Number of Patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>50</td>
<td>62.50%</td>
</tr>
<tr>
<td>Negative</td>
<td>30</td>
<td>37.50%</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>100%</td>
</tr>
</tbody>
</table>

REFERENCES