

# Hair Dyes (Black Stone) Toxicity and its Complications

MAZHAR ABBAS<sup>1</sup>, MUNAZZA NOOR<sup>2</sup>, AZHAR ABBAS KHAN<sup>3</sup>

## ABSTRACT

The insecticidal suicides now a day are replaced by the domestic use chemicals, which are cheaper and good in taste as compared to bad odor and taste of insecticides. The aim of current study was to find out clinical course, complications and management of black stone (Kala Pathar) commonly used as hair dye. Three years consecutive data collection was done from casualty departments of two different hospitals. The parameters i.e. patients' presentations, complications and biochemical analysis were performed. The investigated patient's gender ratio was 24 females and 01 male. The angioedema along with rhabdomyolysis and kidney failure are major clinical complications of the black stone. The emergency treatment with steroids and hydration may be the possible therapy. In addition, the tracheotomy considered as good emergency management. The proper awareness campaign regarding availability and dangerous aspects of black stone (kala pathar) also is warranted for future

**Keywords:** Black stone, toxicity, hair dyes

---

## INTRODUCTION

Suicide becomes the major problem in all over the world especially in developing countries, among 15-44 years old generation. Here, the suicide does not mean to eat any poison or poisonous food material but it also using a chemical directly on skin. Kala pathar is an important poison, which contains Paraphenylene Diamine (most active ingredient of kala pathar). This ingredient crushed and mixed with henna to dye the hairs (Bowen, 1963).

Paraphenyl Diamine (PPD) is brown or black color substance highly toxic and a good hydrogen donor, easily soluble in hydrogen peroxide but insoluble in water. It contains harmful chemicals which directly affect the skin and enter into skin and start work to poisonous on systems of body. PPD mobilized by electron oxidation with an active radical cytochrome P450 which can be further oxidized. This self-harm poison is most harmful and highly toxic to respiratory, hepatic, renal and cardiac systems by inhibiting cellular oxidation and also effect on muscular (Shafiqet *al.*, 2015). PPD ingested and cause rapid development of oedema, dysphagia, dyspnea, rhabdomyolysis and acute renal failure are the major symptoms (Ram *et al.*, 2007).

In all over the world there were more than one million fatalities mostly in developing countries due to this self-harm poison (Lee *et al.*, 2008). The disease symptoms depended on its dose. When a person

takes orally PPD, it starts to show its symptoms after a time about 6-24 hours. Low dose causes oedema and hepatitis while, high dose cause acute renal failure. No antidote available for this poison (Kondle *et al.*, 2012). Excessive use of this poison become a major problem in emergency departments of hospitals. Although it may lead to death and put on the immense strain on hospital services. Finally, it is trend among all over the world's developing and undeveloping countries to hair dye by using this poisonous substance which resulted in high mortality (Akbar *et al.*, 2010).

## METHODOLOGY

The study was conducted at District head Quarter (DHQ) Hospital Bhakkar and Al-Hadi Medical Complex Bhakkar during March 2013 - December 2016. The 25 cases of black stone or kala pathar (hair dyes) ingestion presented to casualty departments of both study centers. The ratio of female and male patients was 24:1 respectively and age range of both the genders was 15-30 years. Modes of presentation, sign/symptoms, complications, biochemical testing and outcome of patients were recorded for each patient. Prior to the analysis, the collected data was subjected to Kolmogorov-Simonov normality test. The computation of data was done through Microsoft Excel versions 2010<sup>®</sup> and statistical software Statistix 8.1<sup>®</sup>. The results are presented as means and percentage.

## RESULTS

The Poison (black stone) was taken orally by all patients. More number of females (96%) ingested hair dye and majority of patients were married (80%). The socioeconomic status of all the presented cases

---

<sup>1</sup>Consultant Surgeon, Department of Surgery, District Head Quarter Hospital Bhakkar, Pakistan.

<sup>2</sup>Woman Medical Officer, Department of Surgery, District Head Quarter Hospital Bhakkar, Pakistan.

<sup>3</sup>Assistant Professor, Department of Entomology, Bahauddin Zakariya University, Bahadur Campus Layyah

Correspondence to Dr. Mazhar Abbas email: [drmazhar234@gmail.com](mailto:drmazhar234@gmail.com), [noormunaxa98@gmail.com](mailto:noormunaxa98@gmail.com), [drkupchani@bzu.edu.pk](mailto:drkupchani@bzu.edu.pk) Cell: 0333-4217234

were below poverty level and main reason observed was their suicidal action (Table 1). Burning of mouth orofacial, oedema, qeteling, dysphagia, dyspnea, generalized body pains and strider are the early presentation. Rhabdomyolysis, hepatic damage and acute renal failure were consequences within two to five days.

Table 1: Sex ratio, marital status and socio-economic level of studied patients.

Parameters	%age
<b>Gender</b>	
Male	1(4%)
Female	24(96%)
<b>Marital status</b>	
Single	5(20%)
Married	20(80%)
<b>Socioeconomic level</b>	
Low socio	25(100%)

Table 2: Biochemical changes observed in 25 patients presented with hair dyes oral ingestion.

Ingestion	(n=25)	
	Changed value	Normal
Investigation	10	15
Blood urea > 50mg%	20	5
Serum creatinine > 1.2mg%	20	5
CPK >1000 Ru/lt	25	0
Serum bilirubin > 1.5mg%	5	20
Serum potassium > 6mg%	15	10
Liver enzyme > 50	25	0

**Note:** Leukcytosis was seen in n=10, Raised blood urea and serum creatinine in n=20, Increased serum bilirubin in n=5 deranged, increased potassium levels in n=15 and Liver enzymes in almost all of the 25 patients.

Table 3: Percentage of patients with physiological complications.

Complications	Percent of Patients
Oral erythema	100%
Angioedema	100%
Difficulty in opening mouth	100%
Dysphagia	100%
Rhabdomyolysis	100%
Renal failure	60%
ARDS	20%
Hypocalcemia	32%

Note: CPK levels were usually in thousands and started increasing within 4-6 hours of ingestion.

- Patients with CPK levels more than 15000 Ru/L developed ARF which is 30% of total patients.

- Hypocalcemia observed in about 32% of patient. But only renal patient developed. Carpopedal spasm responded to calcium administration.

Table 4: Amount of dye ingested > 100ml (Occurrence of complications was directly proportional to amount of dye ingested).

Complications	Yes-No
Acute renal failure (ARF)	80%
Oro facialoedema	100%-No
Dysphagia	100%-No

## DISCUSSION

In current studies the 96% females and 80% married patients is indication that the problem is more linked to the family life and socioeconomic status. The second most critical thing is age range of tested cases (15-30 years), which is also a crucial sign that people in their early of super maturity stage are committed to suicides. Easy death, low cost, salty taste and door step availability of hair dyes are the reasons of extreme use of kala pathar in suicides. Our investigations are in agreement with Chrispal et al (2010).

The major components of kala pathar are paraphenylene, diamine, sodium ethylene, diamine tetra acetic acid and propylene glycol, which can result in multi organ failure. The patients who had ingested more than 100ml of kala pathar ARF, ceruicofacioedema occurred 100% and tracheostomy performed in all of them.

Oral erythema, Angioedema, Difficulty in opening mouth, Dysphagia, Rhabdomyolysis observed in 100% of presented patients in our studies, however this percentage is more as compared to earlier studies (Suliman et al. 1983; Kallel et al. 2005; Sakuntala et al. 2015).

Keeping in view the above result and discussion it concluded that, a hair dyes are easily available everywhere and a cheapest way for suicide. The early adult hood girls and early-married women along with their socioeconomic status are more critical sites to look after. A comprehensive campaign for female awareness and engaging those target population in vocational and technical activities would be the possible way to reduce the suicides.

## CONCLUSION

The angioedema along with rhabdomyolysis and kidney failure are major clinical complications of the black stone. The emergency treatment of with anti-histaminic and hydration may be the possible therapy. In addition, the tracheostomy along with renal replacement therapy are also considered as good emergency management.

## REFERENCES

1. Akbar, M., A., Khaliq, S., A., Malik, N., A., Shahzad, A., Tarin, S., M. and Chaudhary, G., M. 2010. Kala Pathar Paraphenylene diamine intoxication; a study at Nishtar Hospital Multan. *Nishtar Med J*; **2**:111-5.
2. Bowen, D. 1963. A case of phenylene diamine poisoning. *Medicine Sci Law*; **3**:216-9
3. Kondle, R., et al. 2012. Clinical Profile and Outcomes of Hair Dye Poisoning in a Teaching Hospital in Nellore. *ISRN Emergency Medicine*. doi:10.5402/2012/624253.
4. Lee, H., L., et al. 2008. Presentations of patients of poisoning and predictor of poisoning related fatality: Findings from a hospital-based prospective study. *BMC Public Health*; **8**:7.
5. Ram, R., Swarnalatha, G., Prasad, N. and Dakshinamurty, K., V. 2007. Paraphenylenediamine ingestion. An uncommon cause of acute renal failure. *Postgrad J Med*; **53**:181-2.
6. Shafiq, M., Maqbool, F., Iqbal, A. and Baqai, Z., H. 2015. "Kala pathar poisoning". *JRMC*; **19**(1):98-99.
7. Sakuntala, P. et al. 2015. Clinical Profile and Complications of Hair Dye Poisoning. *Int. J. Sci. Res. Publications*; **5**(6): 1-4.
8. Kallel H, et al., (2005;18:308) Clinical Manifestations of Systemic Paraphenylene Diamine Intoxication. *J Nephrol*.
9. Suliman SM(1983;2:633-5), Homeida M, Aboval OI. Paraphenylene Diamine Induced Acute Tubular Necrosis Following Hair Dye Ingestion. *Human Toxicol*.