



Complications of Kala Pathar (Paraphenylene Diamine) Poisoning

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ABSTRACT

Introduction: Kala pathar (Paraphenylene Diamine) is one of the hair dying substance and is commonly used in developing countries like Pakistan. The cases of its exposure accidentally as well as for suicidal intent are commonly seen in emergency departments with wide range of clinical spectrum. **Objective:** To determine the frequency of different complications seen in cases with kala pathar poisoning. **Methods:** This cross sectional study was done at Department of Medicine, Sheikh Zayed Hospital, Rahim Yar Khan from the period of July 2016 to December 2016. The patients with age 12-60 years having suspected history of PPD exposure were taken. The data regarding the type, duration and intent of exposure was taken along with the other demographics. They were then underwent extensive investigation to look for various complications. **Results:** In this study there were 60 cases, comprising 22 (36.67%) males and 38 (63.33%) females with mean age 25.42 ± 7.42 years. Out of 60 cases, 54 (90%) were unmarried and 56 (93.33%) had oral ingestion in contrast to 04 (6.67%), trans-dermal intoxication. All those cases that had trans-dermal intoxication had the accidental exposure while out of 56 cases that had oral intake 54 (90%) had it with suicidal intent. Dysphagia was seen in 44 (73.33%) cases, followed by hyperkalemia (53.33%) and then maxillofacial edema (40%). There was almost equal distribution of acute renal failure and arrhythmia while acute hepatitis was seen in only 8 (13.33%) of cases. **Conclusion;** Kala pathar intoxication is common in female gender, younger age groups and unmarried population. Its toxicity is also common with oral intake. Dysphagia and hyperkalemia are the most common complications of this.

Key words; kala pathar intoxication, PPD, ARF

INTRODUCTION

A million number of deaths are found across the globe that are caused by the suicidal attempts that can be prevented and their number is increasing in the recent era due to various factors.¹ The developing world is thought to be the most effected area and only in Asia their number has doubled in the past half of the century.²

A long list of techniques used to self-harm is found and even longer is the list of the agent used to end the life. Organophosphorous poisoning, kala pathar (Paraphenylene Diamine also known as PPPD), narcotic drugs, acetaminophen, wheat pills, acids, alkalis etc. are used for this purpose with varying degree of prevalence and success. The

factors influencing to these can be availability of the agent, toxicity rate, and the cost of the substance.³

Kala pathar or PPD is a substance that quickly dissolves in hydrogen peroxide and then in the body, it is metabolized by cytochrome P450 system leading to its oxidation and ending up in a very toxic product that can escalate different types of reaction and even anaphylaxis.⁴⁻⁵ Patients can present with range of symptoms and signs depending upon the route of intoxication, amount of its used and duration before reporting to the hospitals. The signs and symptoms include anaphylaxis reaction with swelling over the face and the oral cavity, dysphagia, and also injury to the pharynx, tongue and upper gastrointestinal tract (GIT). It can also cause acute hepatitis, renal failure, different types of arrhythmias and

electrolyte imbalance.⁶

The studies have built time association curve that the longer the time to its exposure and higher are the chances of its toxicity especially if taken more than 6 hours.⁷⁻⁸. The chances of these complications is also higher because of the absence of the specific antidote for this.⁹⁻¹⁰

MATERIAL AND METHODS

This was a cross sectional study. This was carried out at Department of Medicine, Sheikh Zayed Hospital, Rahim Yar khan from the period of July 2016 to December 2016. The cases with the following inclusion and exclusion criteria were enrolled.

Inclusion Criteria

The cases with either gender ranging from 12 to 60 years of age, that had history of suspected exposure to kala pathar poisoning were selected. The history of exposure was either taken from the patients if cooperative or from their attendants.

Exclusion Criteria

1. The cases with no clear evidence of exposure to this agent were excluded.
2. The cases already suffering from cardiac, renal, liver disease were also excluded, which was assessed by the history and medical record.
3. Patients that were un- cooperative or not giving written consent were also excluded.

They were then assessed to look for the symptoms like dysphagia, and to look for maxillofacial edema. ECG, serum potassium level, renal function and liver functions test were also conducted to label the respective complications.

Statistical analysis

In this cross sectional study 60 cases that were exposed to kala pathar intoxication were enrolled. All the data was entered and analyzed using SPSS version 20. The detailed socio-demographic data and clinical history and examination was done. The mean and standard deviation were calculated for age and duration of

poisoning. Frequencies and percentages were calculated for categorical data. Post stratification Chi square test was applied and the p value of ≤ 0.05 was taken as significant.

RESULTS

In this study there were 60 cases, out of which 22 (36.67%) were males and 38 (63.33%) females. The mean age was 25.42 ± 7.42 years. The mean duration of intoxication with kala pathar before presentation to the hospital was 6.25 ± 0.55 hours (Table 1). Out of 60 cases, 54 (90%) were unmarried and 56 (93.33%) had oral ingestion in contrast to 04 (6.67%), trans-dermal intoxication. All those cases that had trans-dermal intoxication had the accidental exposure while out of 56 cases that had oral intake 54 (90%) had it with suicidal intent. Dysphagia was the most common complication seen as it affected 44 (73.33%) of cases. It was followed by hyperkalemia (53.33%) and then maxillofacial edema (40%). There was almost equal distribution of acute renal failure and arrhythmia while acute hepatitis was seen in only 8 (13.33%) of cases as in Table 3.

Table 1: Demographics of study subjects.

	Mean	Range
Age	25.42 ± 7.42	12-60 years
Weight	45.35 ± 7.75	26-87 kg
Duration of poisoning (hrs)	6.25 ± 0.55	3-24 hours

DISCUSSION

Paraphenylene Diamine also known as Kala pathar is a hair dying agent. It is widely used to color the hair due to its cheap price and easy availability across the developing third world. The properties that lead to its easy use share the same chance and risks leading to its intoxication and hence ending up in range of complications including fatal outcomes.

In this study out of 60 cases, 22 (36.67%) were males and 38 (63.33%) females and maximum cases i.e. 49 (81.67%) of cases had age less than 30 years. This shows that the young age and females

gender are the risk factors for this. This was also observed by many studies in the past that also had more or less the same results.^{7, 11} The reason of this can be labile mood, instability in the emotions and social and family pressures that can interfere with the normal living of these cases and hence lead to take these aggressive steps.

Table 2: Study variables (n=60).

Variables		No.	Percent
Gender	Male	22	36.67%
	Female	38	63.33%
Age groups (years)	Less than 30	49	81.67%
	More than 30	11	18.33%
Marital status	Married	6	10%
	Un married	54	90%
Mode of intoxication	Oral	56	93.33%
	Transdermal	04	6.67%
Intent	Suicidal	54	90%
	Accidental	06	10%

Table 3: Complications of PPD poisoning (n=60).

Complications	Number	Percent
Acute renal failure	16	26.67%
Cardiac arrhythmia	12	20%
Acute hepatitis	8	13.33%
Dysphagia	44	73.33%
Hyperkalemia	32	53.33%
Maxillofacial edema	24	40%

Similar was seen that 54 (90%) of such cases were unmarried and 56 (93.33%) had oral ingestion in contrast to 04 (6.67%), trans-dermal. And almost all of the oral intakes were for suicidal intent. This also reinforces the fact that this agent is highly used for suicidal attempts. Secondly the good thing about is that the toxicity of such chemical with transdermal route is very less. This was also observed by the studies in the past. This was also observed by the studies done by Nirmala et al and Khan et al that also found that almost 90 to 95% of their studies were intoxication with suicidal attempt.^{8, 12}

Dysphagia was the most common complication seen as it affected 44 (73.33%) of cases. This was also observed by the study done by Khuhro et al that found it in almost 100% of their 16 cases that had it orally.¹³ It was followed by hyperkalemia (53.33%) and then maxillofacial edema (40%). The studies done by the Kellel H et al and Prabhakaran AC et al also revealed that similar percentage had it.¹⁴⁻¹⁵ Hyperkalemia can be due to rhabdomyolysis that is resulted due to toxic injury of this substance to the muscular system. There was almost equal distribution of acute renal failure and arrhythmia with slightly higher number of renal failure. The direct toxicity of the substance to kidneys and the added factor of rhabdomyolysis can be the cause of it. The studies done by Tiwari D et al also found renal failure in higher number and found as higher as 38% of their cases.¹⁶

CONCLUSION

Kala pathar intoxication is commonly encountered in wards and emergency settings in our population. It is common in female gender, younger age groups and unmarried population. Dysphagia and hyperkalemia are the most common complications of this.

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