

ACUTE RENAL FAILURE AMONG KALA PATHAR POISONING PATIENTS

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ABSTRACT

Background: Kala pathar is a chemical used as hair dye in the developing countries. Cases of trans dermal absorption are reported, but the main concerns are regarding its suicidal intake, as there is no specific antidote for this. **Objective:** To determine the frequency of acute renal failure in patients with kala pathar (paraphenylene diamine) poisoning. **Methodology:** This cross sectional study was carried out at Department of Medicine, Sheikh Zayed Hospital, Rahim Yar Khan from the period of 1st January to 31st December 2016. The patients with age 15-50 years with history of kala pathar poisoning either by transdermal or oral ingestion (assessed by history) of any amount were included. The frequency of acute renal failure was labeled where the blood urea level was found more than 30 mg/dl and serum creatinine more than 2 mg/dl. The data was entered and analyzed by SPSS by version 21. **Results:** In this study there were 65 cases, out of which 47 (72.31%) were females and 18 (27.69%) males. The mean age was 24.35±9.8years. The mean duration of kala pathar taken before presenting to the hospital was 5.35±0.48 hours. Out of 65 cases 58 (89.23%) had oral intake as compared to 7 (10.77%), trans-dermal absorption. All 7 trans-dermal absorption suffered accidental exposure while out of 58 oral intakes, 54 (93%) took it for suicidal attempt. Acute renal failure was seen in 12 (18.46%) out of 65 cases. Renal failure was common in females affecting 9 (19%) out of 47 cases with p= 0.17. It was significantly higher (19%) in age group less than 30 years (p= 0.04). Renal failure was also significantly associated with cases that took it orally, with suicidal intent and their time to presentation to hospital was more than 4 hours with p values of 0.001, 0.02 and 0.03 respectively. There was no significant difference in terms of marital status, however, it was common in un-married with p= 0.08. **Conclusion:** Kala pathar poisoning is common in our population and acute renal failure is seen almost in every 5th cases. Young age, oral intake, suicidal intent and late reporting to hospitals were significantly associated with acute renal failure.

Key words: Kala pathar Poisoning, ARF, Suicide

INTRODUCTION

Suicide is one of the important preventable health issue, which is a common presentation encountered in the emergency ward and can end up around a million death annually across the world.¹ The highest number of cases are in the developing world especially in the Asia and over the last 50 years it has almost doubled in number.² There are various agents, which have been used for suicidal attempts, and accidental exposures also report for good number of cases. Kala pathar is among one of these agents that come across in emergencies. It contains Paraphenylene Diamine (PPD) that is a chemical, which is used to dye hair in developing world like Asia and Africa and is extremely toxic. It is easily available in the market and there is no check on its sale and hence chance to get it for suicidal intent is very easy and unfortunately with high toxic rates.³

PPD is highly soluble in hydrogen peroxide and is actively metabolized by cytochrome P450 via electron oxidation and result into an active radical that can be very toxic and can lead to anaphylaxis.^{4,5} There are wide spectrum of presentation with its poisoning. There include erythema, edema of face, mouth, tongue, pharynx, and larynx. It can also lead to rhabdomyolysis which releases myoglobin and other chemicals that are not only directly toxic

to renal tubules but they can deposit at the microtubule and blockage can end up in injury and then later on to renal failure. There is a range of cardiac complications in particular the arrhythmias associated with this as well.⁶ Its toxicity is mostly reported in cases taking it orally and when no steps are taken for more than 6 hours.⁷⁻⁸ Acute renal failure usually develop within first week. Angioedema and cardiac arrest are the two most important factors associated with death. Despite the high frequency of cases and mortality, no antidote is available for this poisoning.⁹⁻¹⁰ This study was conducted to determine the frequency of acute renal failure among patients with kala pathar (Paraphenylene diamine) poisoning.

METHODOLOGY

This cross sectional study was carried out at Department of Medicine, Sheikh Zayed hospital, Rahim Yar Khan from the period of 1st January to 31st December 2016.

Inclusion Criteria: The patients with both gender and with age, 15-50 years and history of kala pathar poisoning either by transdermal or oral ingestion (assessed by history) of any amount were included.

Exclusion Criteria:

1. Patients with history of hypertention, diabetes mellitus. (assessed on history and medical record).

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2. Documented cases of acute or chronic renal failure. (assessed on history and medical record)
3. Patients unwilling or not giving proper history were excluded from this study.

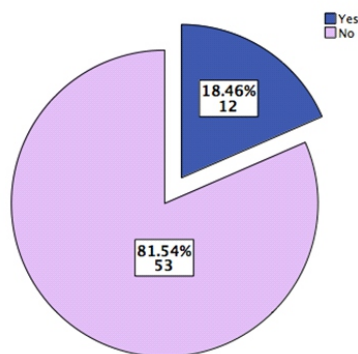
Acute renal failure was labeled where the blood urea level was found more than 30 mg/dl and serum creatinine more than 2 mg/dl.

In this study 65 cases of kala pathar poisoning were registered. The data was entered and analyzed by using SPSS version 21. The detailed socio-demographic data like age, gender, marital status and other clinical data like duration, route and intent of poisoning was taken. The mean and standard deviation were calculated for age and duration of poisoning. Frequencies and percentages were calculated for gender, route and intent of poisoning and outcome in the form of acute renal failure. Post stratification Chi square test was used to see for significance and p value of ≤ 0.05 was taken as significant.

RESULTS

In this study, there were 65 cases, out of which 47 (72.31%) were females and 18 (27.69%) males. The mean age was 24.35 ± 9.8 years. The mean duration of kala pathar taken before presenting to the hospital was 5.35 ± 0.48 hours. Out of 65 cases, 58 (89.23%) had oral intake as compared to 7 (10.77%), trans-dermal absorption. All 7 trans-dermal absorption suffered accidental exposure while out of 58 oral intakes, 54 (93.10%) took it for suicidal attempt. Acute renal failure was seen in 12 (18.46%), out of 65 cases. (Figure I)

Figure I: Frequency of renal failure in kala pathar poisoning



Renal failure was common in females affecting 9 out of 47 cases with $p = 0.17$ (Table I). It was

significantly higher (19%) in age group less than 30 with $p = 0.04$. (Table I)

Table I: Renal failure with respect to demographic variables (n=65)

Variables	Acute renal failure			P. Value
	Yes	No	Total	
Gender	Male	3 (16.6%)	15 (83.3%)	0.13
	Female	9 (19%)	38 (81%)	
Age groups (yrs)	Less than 30	11 (19.3%)	6 (80.7%)	0.04
	More than 30	1 (12.5%)	7 (87.5%)	

Table II: Renal failure with respect to poison and other variables (n=65)

Variables	Acute renal Failure			P. Value
	Yes	No	Total	
Duration of poisoning	Less than 4 hours	2 (16.6%)	10 (83.3%)	0.03
	More than 4 hours	10 (19%)	43 (81%)	
Route of poisoning	Oral	11 (19%)	47 (81%)	0.001
	Dermal	1 (14.3%)	6 (85.7%)	
Intention of poisoning	Suicidal	11 (19.3%)	43 (80%)	0.02
	Accidental	1 (9%)	10 (91%)	
Marital status	Un married	11 (18.5%)	48 (81.5%)	0.08
	Married	1 (16.6%)	5 (83.3%)	

Renal failure was also significantly associated with cases that took it orally, with suicidal intent and their time to presentation to hospital was more than 4 hours with p values of 0.001, 0.02 and 0.03 respectively as in table II. There was no significant difference in terms of marital status, however, it was common in un-married with $p = 0.08$. (Table II)

DISCUSSION

Kala pathar compounds are widely used for hair dye in the third world. Improper handling and easy access has increased the risk of for suicidal intent and accidental exposure. Moreover absence of specific anti dote is also a matter of concern regarding its fatal outcomes. In this study, out of 65 cases, 58 (89.23%) had oral intake as compared to 7 (10.77%) trans-dermal absorption. All 7 trans-dermal absorption suffered accidental exposure while out of 58 oral intakes 54 (93.10%) took it for suicidal attempt. This was also reported by the studies done by Khan N et al that found suicidal intent in 94.74% of cases.⁸ Similar was reported Nirmala and Ganesh et al that found it in around 90% of cases in their study.¹¹ This reveals on one side the satisfactory fact that the trans dermal chances of its toxicity are very less but on the other hand there are concerns regarding their high use for suicidal tendency and there must be some steps taken regarding its availability.

Majority of the cases in our study were young and

were less than the 30 years of age. This was also reported by Akbar et al and Chrispal et al.¹²⁻¹³ The reason of high burden in young age groups could be multifactorial, which can be due to labile mood, insecurity and other emotional disturbances that are high at this age and lead to these unwanted steps.

Acute renal failure was seen in 12 (18.46%) out of 65 cases. This was similar to a study done by Balasubramanian D et al that also had similar results but they further analyzed these cases and found that the cases that had renal failure, they had the worst outcome regarding the mortality.¹⁴ In a study done in India by Tiwari D there were as high as 38% cases with renal failure.¹⁵ This high number may be due to difference in inclusion criteria and also the operational definitions of acute renal failure.

Renal failure was also significantly associated with cases that took it orally, with suicidal intent and their time to presentation to hospital was more than 4 hours with p values of 0.001, 0.02 and 0.03 respectively. This was also seen by the studies done by Kellel et al and Suliman SM et al that also found significantly higher number in such cases.^{16,17} The significantly higher number with oral intake, suicidal intent and late presentation can all be a part of single pathology. As the cases that took it for suicidal intent, all had it in oral form and these cases wanted to end their life, so they took higher doses of it. High dose had the high chances of its toxicity and these cases also hide the fact of its exposure and hence led to delay in presentation and left with more time for the poison to effect on kidneys and led to injury. A study done by Prabhakaran AC et al revealed that the cases that presented over 6 hours after exposure had more of such complication.¹⁸

There were few limitations of this study. As this study was conducted to see only the renal complications and did not focus on other well encountered complications including anaphylaxis, oral, GIT, cardiac and neural complication and also we were not able to look for dose response relationship because of the suicidal attempts, the proper history was lacking.

CONCLUSION

Kala pathar poisoning is common in our population and acute renal failure was seen almost in every 5th cases. Young age, oral intake, suicidal intent and late reporting to hospitals are

significantly associated with acute renal failure among with kala pathar ingestion.

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