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Research Article

RENAL FAILURE IN KALA PATHAR POISONING

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Abstract:

Objective; To determine the frequency of acute renal failure in patients with kala pathar (paraphenylene diamine) poisoning. **Methods;** This study was carried out at multcenters in Pakistan during January to June 2019. 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. 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. **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. Renal failure was common in females affecting 9 out of 47 cases with $p = 0.17$. It was significantly higher in age group less than 30 with $p = 0.04$. 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 (18.46%). Young age, oral intake, suicidal intent and late reporting to hospitals are significantly high found with this complication.

Key words; kala pather poisoning, ARF, suicide

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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 50 year 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 are 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. Cases have been reported where there is absorption via skin during their application for hair dye and few have ingested accidentally.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 maximum reported in cases taken it orally and when no steps are taken for more than 6 hours.⁷⁻⁸ Acute renal failures 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

MATERIAL AND METHODS:

This study was carried out multicenters in Pakistan during January to June 2019.

Inclusion Criteria:

The patients with both gender and age 15-50 years with 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 HTN, DM (assessed on history and medical record).
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.

Statistical analysis;

In this cross sectional study 65 cases of kala pathar poisoning were registered. The data was entered and analyzed 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 (table 01). 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 1). Renal failure was common in females affecting 9 out of 47 cases with $p = 0.17$ (table 2). It was significantly higher in age group less than 30 with $p = 0.04$ (table 2). 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 3. There was no significant difference in terms of marital status, however, it was common in un-married with $p = 0.08$ (table 3).

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 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 seen by the studies done by Khan N et al that found suicidal intent in 94.74% of cases.⁸ Similar was seen 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 was 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

CONCLUSION:

Kala pathar poisoning is common in our population and acute renal failure is seen almost in every 5th cases (18.46%). Young age, oral intake, suicidal intent and late reporting to hospitals are significantly high found with this complication.

Table 01
Study Demographics

	Mean	Range
Age	24.35±9.8	15-51 years
Weight	46.54±6.65	28-95 kg
Duration of poisoning (hrs)	5.35±0.48	2-24 hours

Figure 1

Renal failure in kala pathar poisoning

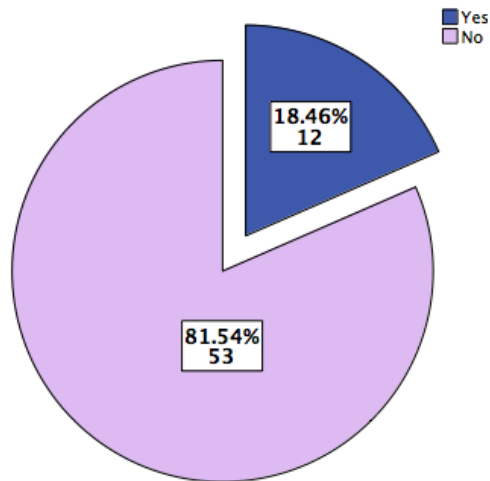


Table 02
Renal failure with respect to demographic variables
n= 65

Variables		Acute renal failure		Significance
		Yes	No	
Gender	Male	3	15	p= 0.13
	Female	9	38	
Age groups (yrs)	Less than 30	11	46	p= 0.04
	More than 30	1	7	

Table 03
Renal failure with respect to poison related variables
n= 65

Variables		Acute renal Failure		Significance
		Yes	No	
Duration of poisoning	Less than 4 hours	2	10	p= 0.03
	More than 4 hours	10	43	
Route of poisoning	Oral	11	47	p= 0.001
	Dermal	1	6	
Intention of poisoning	Suicidal	11	43	p= 0.02
	Accidental	1	10	
Marital status	Un married	11	48	p= 0.08
	Married	1	5	

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