



Outcomes Following Supportive Treatment of Paraquat Poisoning

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Abstract

A Paraquat is a bipyridyl compound used as a herbicide in agriculture. The ingestion of this compound, even in minimal quantity is detrimental and has fatal consequences. In this case series we study 10 cases of Paraquat compound self-ingestion, its clinical course and the potential therapies that can be harnessed in the future for better outcomes.

Keywords: Paraquat poisoning, supportive treatment, prognosis, mortality.

Introduction

Paraquat poisoning is one of the common modalities of self harm in developing countries⁽¹⁾. The abundant availability coupled with lack of regulations for sale make it easily accessible⁽²⁾. Paraquat produces cellular damage by release of oxygen free radicals⁽³⁾. There is no specific antidote for treatment and guidelines with other treatments are also lacking⁽⁴⁾. We report a series of patients who were treated for Paraquat poisoning with supportive measures. Clinical and biochemical presentations along with outcomes are presented.

Materials and Methods

The study was undertaken on a prospective basis in a university teaching hospital. All patients who were seen in the casualty with history of ingestion

of paraquat were included in the study. Patients with poisoning from other materials, patients who were initially treated in other hospitals and patients whose final follow up was incomplete due to discharge against medical advice were excluded from the study.

Detailed history regarding quantity ingested, underlying medical problems and other relevant details were recorded from the patients relatives. Treatment protocol involved securing of recording of vital signs, intravenous access, collection of blood samples for investigations, nasogastric tube passage and gastric lavage. This was followed by administration of activated charcoal. All patients also underwent chest radiographs and arterial blood gas analysis. Patients with severe hypoxia, tachypnoea or impending respiratory arrest were intubated and ventilatory support was given.

Patients with renal involvement underwent hemodialysis or hemoperfusion. N-Acetyl cysteine was administered in patient with evidence of hepatocellular injury. Patients were continuously monitored till either discharge or death.

Results

Ten patients who fit the criteria mentioned above were included in the study. Two patients who were discharged against medical advice were excluded. There were six men and four women. The mean age was 34.3 years (range 20 -53 years). The average quantity of ingested Paraquat was 77ml (range 10 - 250ml). This was present in all patients. All patients complained of odynophagia and burning in the oral cavity. All patients had oral ulceration and vomiting. The clinical presentations are as listed in table 1. Biochemical presentation have been summed up in table 2. The commonest clinical presentation was multi system involvement. Combined Renal,

Hepatic and Pulmonary involvement was seen in all but two patients. One of the two had only renal and pulmonary involvement and other had only renal and hepatic involvement. The findings are shown in table 3. Eight out of ten patients (80 percent) died. Mortality happened at an average of 4.87 days (range 1-9 days) following admission. Commonest cause of death was acute kidney injury.

Table 1 –clinical presentations of patients

Presentation	Percentage of patients
Vomiting	100%
Oral ulceration	100%
Acute kidney injury	100%
Jaundice	80%
ARDS	80%

Table 2 –laboratory parameters of patients

Laboratory parameters	Percentage of Patients
Elevated creatinine	100%
Elevated Bilirubin	80%
Metabolic acidosis	60%
Elevated lactate	40%
Increased WBC count	100%

Table 3 –systems involvement and final outcomes

S.No.	Quantity ingested	Delay in presentation	AKI	HEPATIC INJURY	PULMONARY INVOLVEMENT	ACIDOSIS	HD/HP	SURVIVAL PERIOD	OUTCOME
1	15ml	20 hours	yes	No	Yes	Yes	Yes	7 days	Death
2	40ml	7 hours	Yes	Yes	Yes	Yes	Yes	4 days	Death
3	25ml	6 hours	Yes	Yes	Yes	Yes	No	3 days	Death
4	100ml	14 hours	Yes	Yes	Yes	No	Yes	9 days	Death
5	200 ml	8 hours	Yes	Yes	Yes	Yes	Yes	2 days	Death
6	10ml	16 hours	Yes	Yes	No	No	Yes		Alive
7	10ml	18 hours	Yes	Yes	Yes	No	Yes	8 days	Death
8	100 ml	8 hours	Yes	Yes	Yes	No	Yes	5 days	Death
9	250ml	4 hours	Yes	Yes	Yes	Yes	No	1 day	Death
10	20 ml	2 hours	Yes	Yes	Yes	No	Yes		Alive

Discussion

Although agriculture is a predominant part of the economy and Paraquat is very widely used, only few cases of Paraquat poisoning have been reported from India^(5,6,7).

All of them had few points in common. The diagnosis of Paraquat poisoning was based on history alone. Vomiting and oral ulceration were common presenting features. Multisystem involvement was common. Treatment was only supportive and mortality was very high.

Although our study had only ten patients, this is one of the largest from India. All the above mentioned features were present in our study. Attenders of our patients brought the container which contained the ingested fluid. This helped us confirm that the ingested fluid was only Paraquat and not other herbicides. Also an approximate amount of ingested fluid could be deduced from this.

All patients received only supportive therapy. This is also similar to the other mentioned studies. This

is because of the lack of specific antidote. Estimation of serum and urinary concentration was not done in our patients. Yoon et al⁽⁸⁾ have suggested that the serum concentration and quantity ingested might be the most important prognostic factors for mortality. A dose of 30ml/kg body weight which is equivalent of 7-8ml could be fatal. In our patients, the minimum ingested quantity was ten millilitres with a mean value of 77ml. This could have been the cause of very high mortality in our study group.

The introduction of effective laws to ban the sale and use of Paraquat have been shown to reduce mortality rates^(9,10). However no such ban exists in India. Such an intervention can prevent the mortality following Paraquat ingestion.

Our study had few limitations. Although it is one of the largest studies in India, the numbers are modest to derive any specific conclusions. The estimation of serum and urinary concentrations of Paraquat could have guided treatment better.

In conclusion, Paraquat poisoning is a significant hazard and important cause of mortality. Because of the absence of specific antidotes, treatment is predominantly supportive. Legislation is necessary to prevent the sale of Paraquat which could prevent deaths due to an ingestion of Paraquat.

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