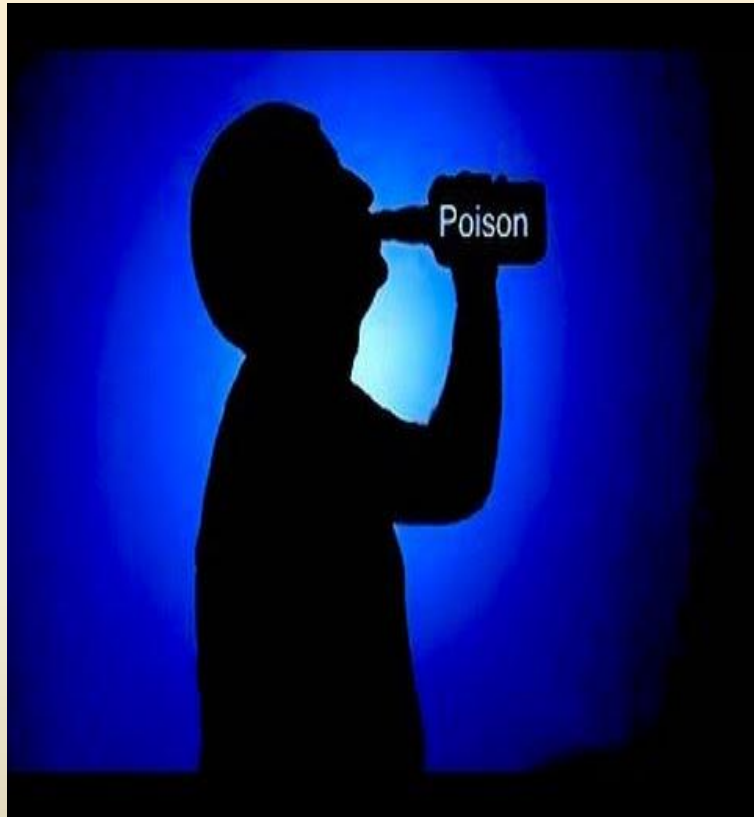


Paraquat Poisoning:An emergent toxicological threat



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Introduction

- Paraquat (1,1'-dimethyl-4,4'-dipyridylium) ,
a broad spectrum quaternary nitrogen
liquid herbicide.
- It is a fast acting and nonselective compound.

Introduction

- Accidental and intentional ingestion causes severe and fatal toxicity.
- Sprayed on unwanted weeds and other vegetations before planting crops.



Introduction

- Paraquat was first synthesized in 1882
- first manufactured and sold by Imperial Chemical Industries (ICI) in early 1962
- China is now the world's largest manufacturer. producing more than 100,000 tons per year.

Mechanism of toxicity

- Paraquat concentrates in alveolar type I and II cells.
- *Actively secreted by the kidney via organic cation transport systems, leading to accumulation in proximal tubular epithelial cells.*
- Both these leads to generation of toxic reactive oxygen species causes cell injury and cell death.

Clinical feature

Moderate to severe acute poisoning:

- Immediate hours- vomiting, diarrhoea, abdominal pain, mouth and throat ulceration.
- One to four days: renal failure, hepatic impairment, hypotension and tachycardia.
- One to two weeks: respiratory symptom progress to extensive pulmonary fibrosis

majority of cases death occurs within 2 – 3 weeks from pulmonary failure

Clinical feature

Fulminant or hyperacute poisoning:

- immediate: vomiting, diarrhoea, abdominal pain
- hours to days: renal and hepatic failure, pancreatitis, toxic myocarditis, refractory hypotension, coma.
- Death from cardiogenic shock and multi-organ failure occurs within 1-4 days

Situation in Bangladesh

- Acute paraquat poisoning is reported in some part of Asia, the Pacific and the Carribean.
- a significant cause of self-poisoning in Europe and America in eighties and nineties.
- banned in most European countries and Sri Lanka.
- In Bangladesh, paraquat was not used as a common suicidal agent previously.

Situation in Bangladesh

- first case report was published in 2010.
- recently cases of this poisoning have increased significantly.
- In 2015–2016, there were 40 cases in Rangamati Medical College Hospital .
- 17 in Rajshahi Medical College Hospital
- 7 cases in Dhaka medical college hospital

Situation in Bangladesh

- First case report from Bangladesh published in J MEDICINE 2010; 11 : 176-179 by MOHAMMED ISHAQUE MAJUMDER and others
- *A 21-yr-old female patient with paraquat poisoning*
- *with complaints of retrosternal and epigastric pain, mild respiratory distress and jaundice was admitted.*

Situation in Bangladesh

- *Her respiratory distress, renal and liver function deteriorated*
- *was shifted to ICU and died on fourth day of poisoning.*
- *Methylprednisolone and cyclophosphamide pulse therapy was given .*
- *died from multi-organ failure.*

Situation in Bangladesh

- J Enam Med Col Vol 7 No 2, May 2017
- Fatal Paraquat Poisoning in a 15-Year-Old Girl by Rukhsana Parvin and others.
- *15-year-old girl who presented with history of attempted suicide with paraquat.*
- *Patient died due to respiratory failure despite aggressive treatment and hemodialysis.*

Situation in Bangladesh

- A study “Outcome of Paraquat poisoning is admitted patient in RMCH by Abu Shahin Md, Mahbubur Rahman others
- 17 cases. 6 male, 11 female.
- Almost all cases have hepatic and renal involvement
- 11 died (65%). 10 ml is enough for fatal event
- Time line of fatality 2 hours to 4 days.

Our experience in SOMCH

So far we manage 3 cases: Case 1

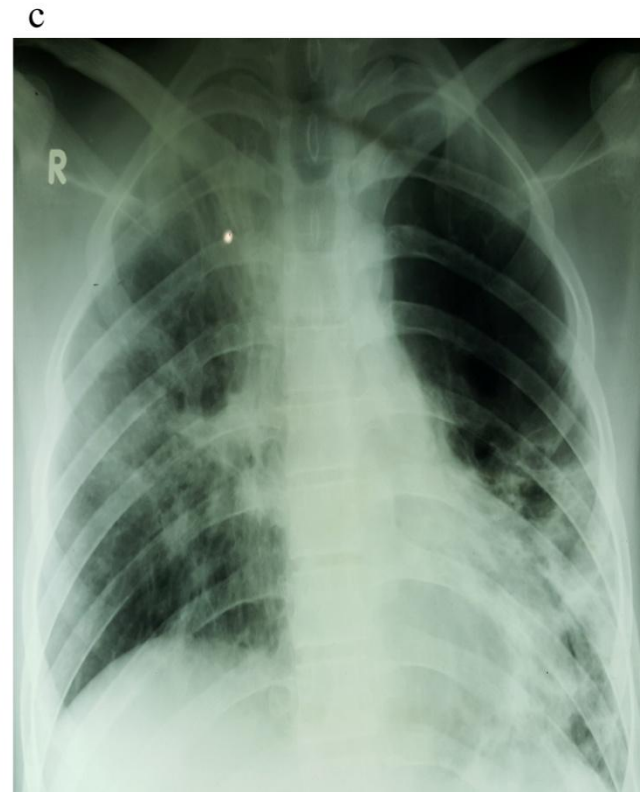
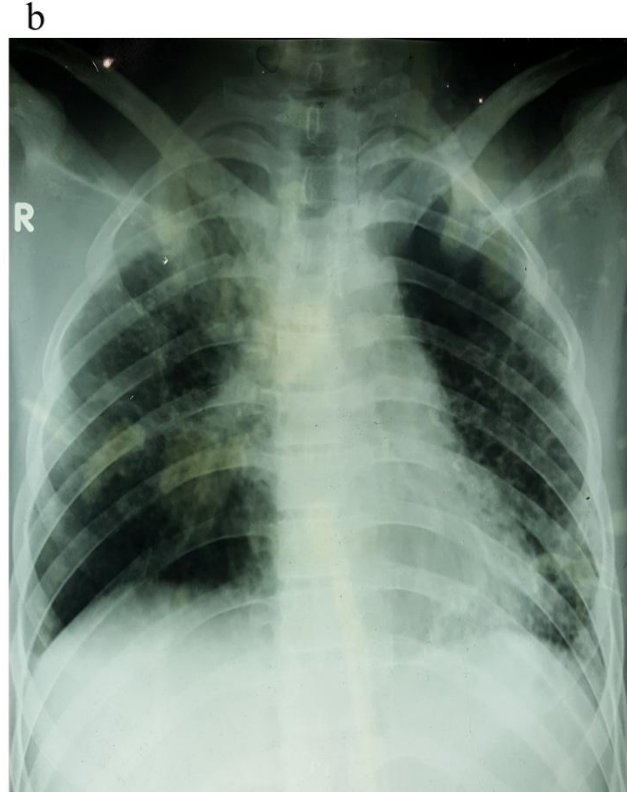
- A 18 years old healthy male was admitted with history of Paraquat poisoning
- with oral ulceration and high serum creatinine but otherwise asymptomatic,
- discharged on day 10 when his renal function settled.
- By day 15, he developed irregular fever, shortness of breath and nonproductive cough , unresponsive to conventional treatments.

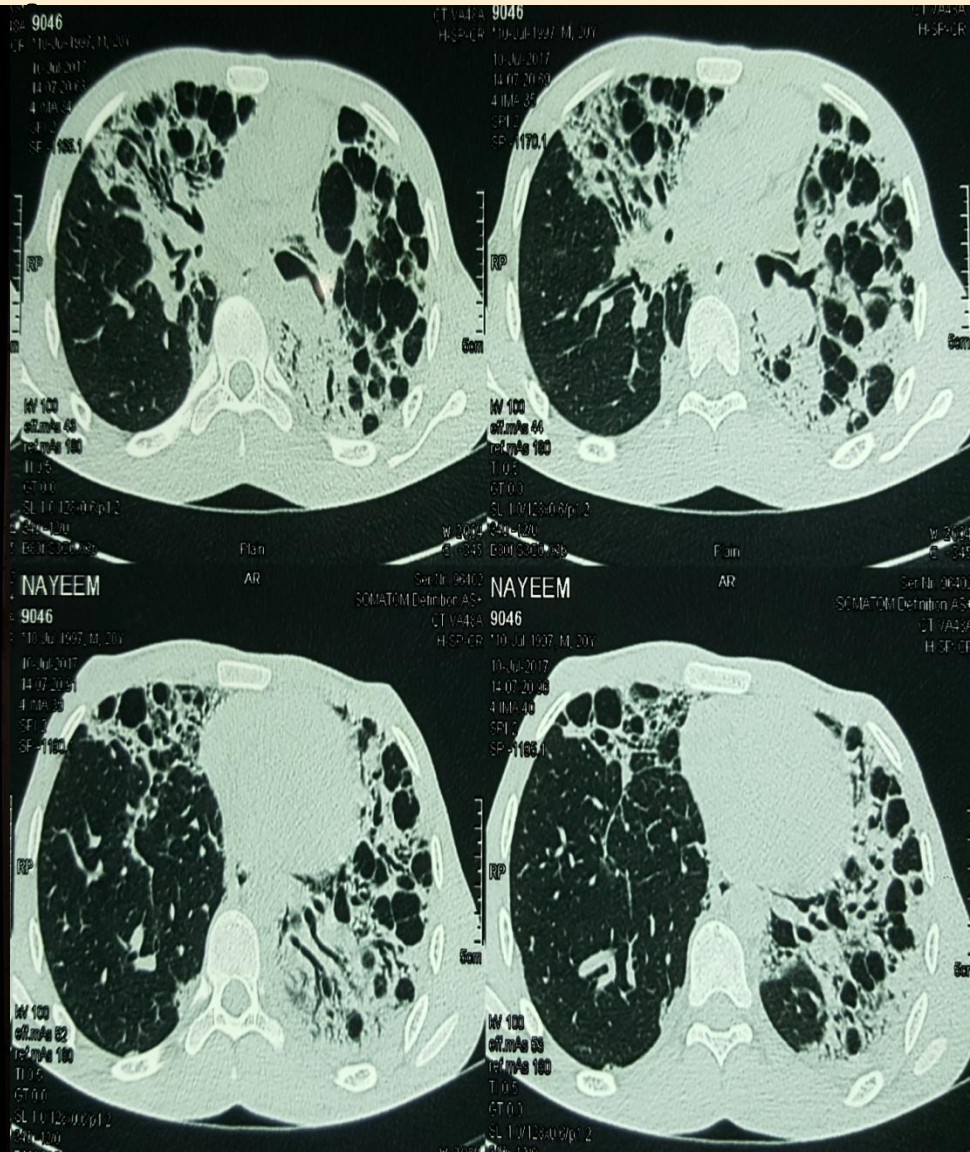


Experience in SOMCH

- By day 30, his symptoms were so severe that he had to get admitted again.
- When he was found to develop bilateral extensive lung fibrosis.
- He was started with injectable Methylprednisolone and kept in close observation in HDU.
- He died on day 45.

Figure; serial chest radiograph after paraquat poisoning. day 1, 15, 30,





CASE 2

- A 55 years old male, chronic smoker and had COPD, was admitted with unintentional ingestion of Paraquat.
- On admission, he had oral ulcer and high serum creatinine but no respiratory symptoms.
- His conditions improved with conservative management and renal function settled.
- and he was discharged on day 13 with advice of monthly follow-up.

Case -3

- A 24 years old electrician with a history of familial conflict was admitted.
- with irregular fever, SOB, vomiting and oliguria.
- oral ulceration and few crepitations on both lungs.
- vitals were within normal limit with SpO2 of 94% in room air.
- investigations showed neutrophilic leukocytosis and high serum creatinine .

Case-3continued

- Got 3 sessions of haemodialysis and creatinine level started to fall, but shortness of breath progressed .
- By day 10, was unable to maintain SpO2 without supplemental Oxygen.
- CXR showed bilateral diffuse ground glass opacity.
- On further enquiry, he admitted to ingestion of Paraquat.
- He developed bradycardia on day 12. shifted to ICU and died on day 18.

Challenges have to overcome

- 1.Lack of awareness of physician and health professionals.
- 2.Diagnostic challenge.
- 3.Management challenge.
- 4.Lack of sufficient medical data in our country

Diagnostic challenge

- No facilities available for confirmatory test

Qualitative test tube test

Quantitative measurement of paraquat in blood

- Confused with Organophosphorus poisoning
- Diagnosis made on the basis of circumstantial evidence, history, empty container, paraquat tongue

Qualitative test tube test

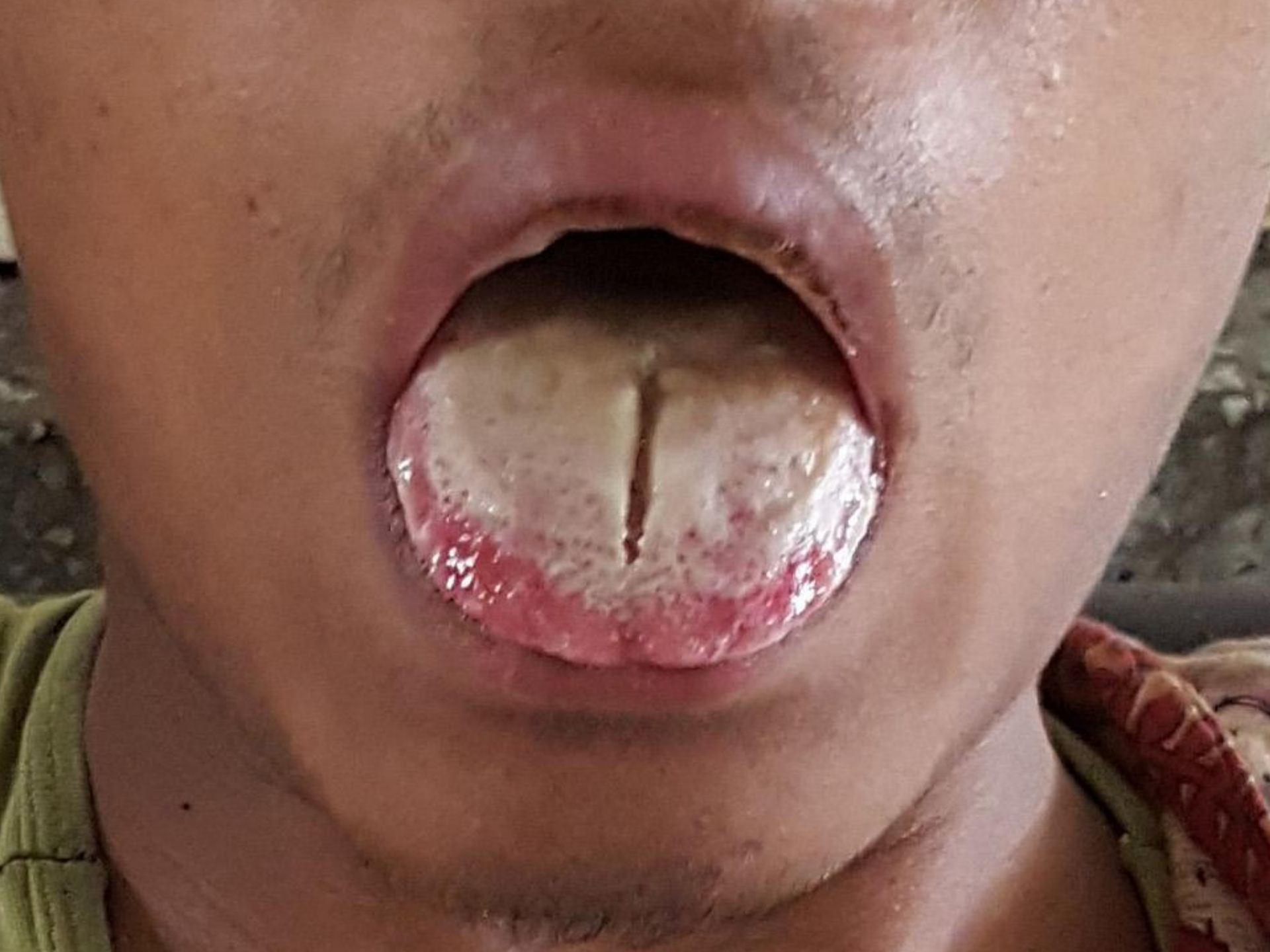
- *A blue or green colour in the solution denotes the presence of paraquat and confirms the diagnosis.*



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Paraquat



Management challenge

- 1.No specific antidote,only support care.very high mortality,50-90%
- 2.Majority cases required ICU admission.lack of ICU bed.
- 3.Don't dischrge early.respiratory involvement occur after improvement of renal function.
- 4.Cyclophosphamide/steroid not so effective

Conclusion

- The mortality is incredibly higher than any other poisoning.(50-90%).
- There is no specific antidote so treatment is supportive
- 5-10ml paraquat is enough for toxicity
- Large dose causes death due to multiorgan failure within hours to days.
- small to intermediate dose causes death due to pulmonary fibrosis within weeks to months.

Conclusion

- As incidence is increasing so awareness should be generated among people as well as health workers and policy maker
- issuing a ban on Paraquat like 38 other countries i.e. European Union, Sri Lanka, Vietnam and South Korea, will effectively lower deaths from poisoning in Bangladesh.

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Referances

- 1.J MEDICINE 2010; 11 : 176-179. Fatal Deliberate Self Harm with Paraquat.MOHAMMED ISHAQUE MAJUMDER,1 MOHAMMAD MAHFUZUL HOQUE,2 B.U.M WAHID AHMED,2 A.H.M WALLIUR RAHMAN,3 SHEIKH MOHAMMAD NOOR- E-ALAM,4 MD. ABUL FAIZ5.
2. J Enam Med Col Vol 7 No 2 May 2017 Fatal Paraquat Poisoning in a 15-Year-Old Girl.Rukhsana Parvin, Md Kamrul Hasan, Priyanka Sarkar, Nazmun Nahar Mouri .
- 3.Outcome of paraquat poisoning-admitted in Rajshahi medical college hospital,j.of medicine2016. Abu shahinMohammed MahbuburRahman, FoysalBin SelimKhan, ZahhirulHaque, MdKhalilurrahman, MdRobed Amin, MA Faiz
- 4.Fatal multi organ involvement in paraquat poisoning.BANTROPTOX2017.ISHRAT TAHSIN,zhm nazmul alam,ABDUL MUMITH RUHAN,MD.SHAFIQUUL BARI,FAZLE RABBI CHOWDHURY

Referances

5. Chowdhury FR, Dewan G, Verma VR, et al. Bans of WHO Class I Pesticides in Bangladesh - Suicide Prevention without Hampering Agricultural Output. *International Journal of Epidemiology* 2017; 1-10.
6. Gawarammana IB, Buckley NA. Medical management of paraquat ingestion. *British Journal of Clinical Pharmacology* 2011; 72(5): 745-757.
7. L. Senarathna, M. Eddleston, M.F. Wilks, et al. Prediction of outcome after paraquat poisoning by measurement of the plasma paraquat concentration. *QJM: An International Journal of Medicine* 2009; 102(4): 251-2
8. Roberts, D.M. (2015). Herbicides. In: Hoffman, R.S., Howland, M., Lewin, N.A., Nelson, L.S., Goldfrank, L.R. (eds.), *Goldfrank's Toxicologic Emergencies, 10e. Chapter 112*. New York, NY: McGraw-Hill
9. Roberts, J.R. and Reigart, J.R. (2013). *Recognition and Management of Pesticide Poisonings, 6e*. Washington, DC: US Environmental Protection Agency



THANK YOU