ORIGINAL ARTICLE

Examine the Frequency of Acute Renal Failure in Patients with Paraphenylene Diamine Poisoning

UMAIR ARIF[1], MUHAMMAD RIZWAN HAFEEZ[2], SIBGHA BASHIR[3], *ADIL MEHMOOD[4], RANA AATIF SIDDIQUE[5], SAIMA NASREEN[6]*

[1,4]Assistant Professors, [6]Associate Professor of Medicine QAMC/BVH Bahawalpur

[2,5]Assistant Professor of Medicine, [3]Asst Professor of Chemical Pathology, Shahida Islam Medical & Dental College Lodhran

Correspondence to Dr. Muhammad Rizwan Hafeez Email: drrizwanhafeez@gmail.com Cell 0300-6825950

ABSTRACT

Aim: To determine the frequency of renal failure in patients presented with paraphenylene diamine (PPD) poisoning.
Study design: Retrospective/Observational
Place and duration: Department of Medicine Shahida Islam Medical & Dental College Lodhran from 1st August 2018 to 31st August 2019.
Methods: Eighty patients of both genders presented with paraphenylene poisoning were enrolled in this study. Patients demographics including age, sex and reasons of ingestion of PPD were recorded after taking written consent from patients/attendants. Clinical presentation including sign and symptoms were recorded. Frequency of acute renal failure was examined by serum creatinine mg/dl.
Results: Sixty two (77.5%) were females while 18(22.5%) were males. The mean age was 24.32±6.54 years. Suicide was the most common reason for poisoning of PPD found in 76 (95%) cases. Cervicofacial edema was the commonest symptom found in 74(92.5%) patients. Acute renal failure was observed in 65 (81.25%) patients. From 65 ac renal failure patients 60(92.31%) were recovered after treatment while 5 (7.69%) had residual renal damage.
Conclusion: The frequency of acute renal failure in paraphenylene diamine poisoning patients was very high, however quick medical treatment helps to reduce the morbidity and mortality.
Keywords: Paraphenylene diamine poisoning, Acute renal failure

INTRODUCTION

Paraphenylene diamine poisoning (PPD) ingestion causes multiple organ dysfunctions. PPD is allergenic and tubulotoxic and causes angioneurotic edema and rhabdomyolysis, which lead to renal failure[1,2]. Black stone or chemically known as paraphenylene diamine is one of the major facilitators of suicide in women particularly. In the 2017 year, 70 women in Punjab alone gave up their lives using black stone over financial troubles, domestic disputes and societal pressure[3-5]. Black stone that is commonly used in hair dyes and henna is a strong coloring agent[6]. Unfortunately, in the wake of the recently increased number of suicides black stone, commonly known as Kalaa Pathar, is regarded as the cheapest poison for suicide[7,8]. But, what's even more concerning is that anyone can get this PPD at the cheapest price and is still being shamelessly sold in the market. Reportedly, three people are committing suicide every single day in the province of Punjab. The majority of the consumers are women belonging to lower or middle class[9,10].

However, no one knows that even though the chemical has been previously banned and the ban has been reimposed as well, but it is still being openly sold and is reachable to people of all ages including the younger lot. To overcome the problem, we need to act as a responsible citizen and keep an eye if this life. The present study was conducted to examine the frequency of acute renal failure in patients presented with paraphenylene diamine (Kala Pathar) poisoning.

Received on 27-10-2019
Accepted on 14-05-2020

MATERIALS AND METHODS

This prospective/observational study was conducted at Department of Medicine Shahida Islam Medical & Dental College Lodhran from 1st August 2018 to 31st August 2019. Total 80 adult patients of both genders presented with paraphenylene ingestion were enrolled in this study. Patients demographics including age, sex and reasons of ingestion of PPD were recorded after taking written consent from patients/attendants. Patients with other than PPD poisoning, patients with history of cardiac issues and surgery, patients who were on renal surgery and patients died within 5 hours of PPD ingestion were excluded from this study. Patient's complete clinical examination was done and sign/symptoms were recorded. Frequency of acute renal failure was examined by serum creatinine mg/dl. Mortality associated with acute renal failure was examined. All the data was analyzed by SPSS 24.

RESULTS

There were 62 (77.5%) were females while 18 (22.5%) were males. The mean age of patients was 24.32±6.54 years. Suicide was the most common reason for poisoning of PPD found in 76 (95%) patients followed by accidental in 2(2.5%) patients and homicidal in 2(2.5%) patients (Table 1). According to the sign and symptoms, cervicofacial edema was the commonest symptoms found in 74(92.5%) patients, dysphagia found in 60 (75%) patients, brown urine in 60(75%) patients, pain of limbs in 62 (77.5%) patients, respiratory issues in 48 (60%) patients, tachycardia found in 25(31.25%), chest pain found in 15(18.75%),

hypotension in 8(10%), palpitation in 10%, anuria in 2 (2.5%), oliguria in 7(8.75%), convulsion in 4(5%) and nasal regurgitation in 3(3.75%) patients (Table 2), According to the incidence of acute renal failure, we found 65 (81.25%) patients had acute renal failure (Fig. 1). From 65 acute renal failure patients 60(92.31%) were recovered after treatment while 5(7.69%) patients had residual renal damage. No mortality was observed in patients with acute renal failure (Table 3).

Table 1: Demographics of all the patients

Variable	No.	%
Age (years)	24.32±6.54	
Gender		
Male	18	22.5
Female	62	77.5
Reasons of PPD ingestion		
Suicide	76	95
Accidental	2	2.5
Homicidal	2	2.5

Table 2: Clinical presentation of all the patients

Variable	No.	%
Cervicofacial Edema	85	85.0
Dysphagia	76	76.0
Brown Urine	75	75.0
Pain of Limbs	79	79.0
Respiratory Issues	61	61.0
Tachycardia	30	30.0
Chest Pain	20	20.0
Hypotension	11	11.0
Palpitation	10	10.0
Anuria	3	3.0
Oliguria	8	8.0
Convulsion	5	5.0
Nasal Regurgitation	4	4.0

Fig. 1: Frequency of acute renal failure in PPD poisoning patients

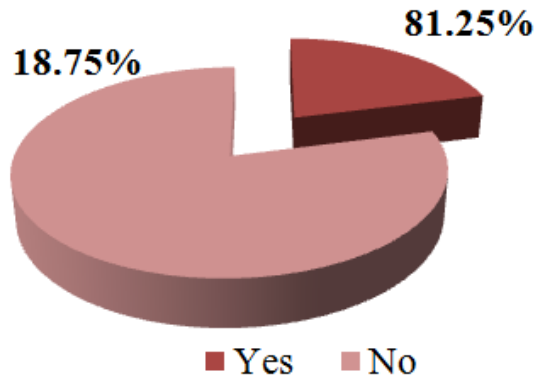

Table 3: Outcomes of acute renal failure patients (n=65)

Outcome	No.	%age
Recovered	60	92.31
Residual renal damage (serum creatinine >2mg/dl	5	7.69

DISCUSSION

Paraphenylene diamine poisoning is the commonest and cheapest form of dye available in North Africa and the Middle East, known as stone dye, and contains the highest concentration of PPD (from 70-90%).[11,12] Other branded hair dyes contain lesser concentrations of PPD, typically from 2 to 10%[13]. The formation of oxide derivatives of PPD such as benzoquinone diimide is responsible for destruction of muscle cells by a mechanism of membrane lipid peroxidation which leads to muscle necrosis and also produces fatal effects on various organ by causing angio-neurotic edema, myocarditis and rhabdomyolysis[14,15]. Due to its improper handling, easy availability and low cost, it becomes a common mode of self-poisoning in rural areas of Pakistan and India. Moreover, absence of specific antidote is also a matter of concern regarding its fatal outcomes.[16] In our study 62 (77.5%) were females while 18 (22.5%) were males. The mean age of patients was 24.32±6.54 years. Suicide was the most common reason for poisoning of PPD found in 76 (95%) patients followed by accidental in 2 (2.5%) patients and homicidal in 2 (2.5%) patients. These results were similar to many of studies in which females were predominant and the average age was 24 years[17,18].

In present study according to the sign and symptoms, cervicofacial edema was the commonest symptoms found in 74(92.5%) patients, dysphagia found in 60(75%) patients, brown urine in 60(75%) patients, pain of limbs in 62(77.5%) patients, respiratory issues in 48(60%) patients, tachycardia found in 25(31.25%), chest pain found in 15(18.75%), hypotension in 8(10%), palpitation in 10%. These findings were due to very high toxicity of PPD secondary to development of laryngeal edema, leading to decreased air entry, development of cyanosis, tachycardia and hypotension due to myocardial damage. The myocarditis due to hair dye poisoning has also been reported in various studies[18,19].

In this study acute renal failure was observed in 65 (81.25%) patients. From 65 acute renal failure patients 60 (92.31%) were recovered after treatment while 5 (7.69%) patients had residual renal damage. Various biochemical investigations have found PPD to be hepatotoxic. Tiwari et al also reported high levels of SGPT/SGOT in their study of hair dye poisoning. In our study, the overall incidence of renal failure was 58.46% while other investigators showed renal failure of more than 70%[12].

The mortality rate in our study was 31.67% which is comparable to that reported by other researchers.[20,21] PPD poisoning is more pronounced among youngsters, illiterate and poor people of the developing countries especially in rural areas. The high rate of morbidity and mortality has raised health concerns associated with PPD poisoning. Intensive supportive care, appropriate interventions including tracheostomy is the mainstay of management.

CONCLUSION

Paraphenylene diamine (Kala Pathar) poisoning is increasing day by day because of its easy availability and this will lead to high mortality and morbidity rate. We concluded that the frequency of acute renal failure in paraphenylene diamine poisoning patients was very high, however quick medical treatment helps to reduce the morbidity and mortality.

REFERENCES

1. World Health Organization Suicide Data. [Mar;2017];World Health. http://www.who.int/mental_health/prevention/suicide/suicideprevent/en/ Suicide. 2017
2. Akbar MA, Khaliq SA, Malik NA, et al. Kala Pathar (paraphenylene diamin) intoxication; a study at Nishtar Hospital Multan. Nishtar Med J 2010;2:111–115.
3. Kondle R, Pathapati RM, Saginela SK, et al. Clinical profile and outcomes of hair dye poisoning in a teaching hospital in Nellore. ISRN Emerg Med 2012;2012:5.
4. Nott HW. Systemic poisoning by hair dye. Br Med J 1924;1:421–422.
5. Khan H, Khan N, Khan N, et al. Clinical presentation and outcome of patients with paraphenylenediamine (kala-pathar) poisoning. Gomal J Med Sci 2015;14:3–6.
6. Sakuntala P, Khan PM, Sudarsi B, et al. linical profile and complications of hair dye poisoning. Int J Sci Res Pub. 2015;5:1–4
7. Anuradha S, Arora S, Mehrota S, Arora A, Kar P. Acute renal failure following paraphenylenediamine poisoning: A case report and review. Ren Fail 2004;26:329-32.
8. Ram R, Swarnalatha G, Prasad N, Dakshinamurty KV Para phenylenediamine ingestion: An uncommon cause of acute renal failure. J Postgrad Med 2007;53:181-82.
9. Chrispal A, Begum A, Zachariah A. Hair dye poisoning – an emerging problem in the tropics: an experience from a tertiary care hospital in south India. Trop Doct 2010;40:100-03.
10. Suliman SM, Fadlalla M, Nasr ME, Beliela MH, Fesseha S, Babiker M et al. Poisoning with hair dye containing Paraphenylene diamine: Ten years' experience. Saudi J Kidney Dis Transpl. 1995;6;286-9.
11. Ram R, Swarnalatha G, Prasad N, Dakshinamurty K V. Paraphenylene diamine ingestion: An uncommon cause of acute renal failure. J Postgrad Med 2007;53:181-2.
12. Jain PK, Agarwal N, Kumar P, Sengar NS, Agarwal N, et al. Hair dye poisoning in bundelkhand region (Prospective analysis of hair dye poisoning cases presented in department of Medicine, Mlb medical college, Jhansi). J Assoc Physicians India 2011; 59: 415-419.
13. Senthilkumaran S, Thirumalaikolundusubramanian P. Acute hair dye poisoning: Lurking dangers. J Mahatma Gandhi Inst Med Sci 2015. 20: 33-37.
14. Abdelraheem MB, Elbushra M, Ali el-T, Ellidir RA, Bushara AI, et al. Filicide and suicide in a family by paraphenylene diamine poisoning: a mother who committed suicide and poisoned her four children of which one died. ToxicolInd Health 2014; 30: 679-682.
15. Senthilkumaran S, Thirumalaikolundusubramanian P. Acute hair dye poisoning: Lurking dangers. J Mahatma Gandhi Inst Med Sci 2015; 20: 33-37.
16. Jedidi M, Hadj MB, Masmoudi T, Adelkarim SB, Mlayeh S, Dhiab MB, et al. Fatal toxic myocarditis induced by Paraphenylene Diamine. A case report. Rom J Leg Med. 2016;24:17-20.
17. Amira D, Gana I, Nouioui A, Khlifi F, Salah DB, Masri W, et al. Paraphenylene diamine Poisoning in Tunisia: A Case Report. Arab J Forensic Sci Forensic Med 2015;1(1):103-13.
18. Khan H, Khan N, Khan N, Ahmad I, Shah F, Rahman AU, Mahsud I. Clinical presentation and outcome of patients with paraphenylenediamine (kala-pathar) poisoning. Gomal J Med Sci 2016; 14(1)3-6.
19. Tiwari D, Jatav OP, Dudani M. Prospective study of clinical profile in hair dye poisoning (PPD) with special reference to electrocardiographic manifestations. International J Med Sci Public Health 2016;5(7):1313-6.
20. Khan MA, Akram S, Shah HB, Hamdani SA, Khan M. Epidemic of kala pathar (paraphenylene diamine) poisoning: an emerging threat in southern Punjab. J Coll Physicians Surg Pak 2018;28(1):44-47.
21. Bhagavathula AS, Bandari DK, Khan M, Shehab A. A systematic review and meta-analysis of the prevalence and complications of paraphenylene diamine-containing hair dye poisoning in developing countries. Indian J Pharmacol 2019; 51:302-15.