

Original Research Article

DOI: <http://dx.doi.org/10.18203/issn.2454-5929.ijohns20174332>

Pathar dye (paraphenyldiamine) poisoning: our experience of this lethal emerging health problem in a tertiary care centre

Shivani Nautiyal*, Shashwat Tiwari, Kumar Ashutosh

Department of ENT, GSVM Medical College, U.P., India

Received: 18 July 2017

Accepted: 04 September 2017

***Correspondence:**

Dr. Shivani Nautiyal,

E-mail: shivani.nautiyal86@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: The aim of this case series study is to share our experiences regarding paraphenylenediamine (PPD) poisoning, its otolaryngological clinical presentation, outcomes and need of tracheostomy in patients of hair dye poisoning at GSVM Medical College, Kanpur, U.P.

Methods: This prospective study was carried out on 165 patients who presented in GSVM medical college Kanpur in period of December 2012 till December 2014. Data including demographic features (age, sex, marital status, socio-economic status), clinical features, laboratory findings, mode of intoxication (accidental or suicide) were collected and recorded.

Results: A majority of the patients were young females (21-30 years) and belonged to a low socioeconomic class. The main cause was intentional suicidal ingestion. Cervicofacial edema, stridor, hoarseness of voice and pain in throat were initial symptoms. Tracheostomy was needed in 115 (69.69%) patients. Mortality of 21 (12.72%) patients was observed.

Conclusions: It is a major emerging health problem with high mortality. It is a medical emergency and early intervention is needed to save patient's life. It is imperative to raise public awareness of the potential toxicity of the dye as well as to educate physicians about the need for aggressive and early treatment.

Keywords: Paraphenylamine (PPD), Pathar dye, Suicide, Cervicofacial edema, Tracheostomy

INTRODUCTION

Suicide is the act of intentionally causing one's own death preventable health problem. About 800,000 people commit suicide worldwide every year, of these 135,000 (17%) are residents of India.¹ Increasing by 60% over the last 50 years especially in developing countries. Suicide is now ranked among the three leading causes of death in the age group between 15 and 44 years. There are many methods of committing suicide, common methods include: hanging, poisoning, and firearms.^{2,3}

Poisoning is a common method used for suicides. In India pesticide poisoning is most common.⁴ Recently hair dyes (kala pathar) poisoning is emerging as an important cause

of suicide in India. Hair dye contains a poisonous compound called paraphenyldiamine which is also known as pathar dye, a local term given to the compound. Hair dyes contain paraphenylenediamine, resorcinol, sodium ethylenediaminetetra acetic acid and propylene glycol which can result in multiorgan dysfunction, rhabdomyolysis, laryngeal edema, severe metabolic acidosis and acute renal failure.⁵ Cervicofacial edema, acute renal and respiratory failures are the major contributors to poor prognosis.⁶ Instant and proper management in an intensive care unit is required to deal with the patients who ingest kala pathar.

The aim of the study is to share our experiences regarding paraphenylenediamine (PPD) poisoning, its otolaryngo-

logical clinical presentation, outcomes and need of tracheostomy in patients of hair dye poisoning at GSVM medical college, Kanpur, U.P.

METHODS

This is a prospective study design. The present study is carried out on 165 patients presenting with history of hair dye ingestion in emergency department, GSVM Medical College, Kanpur from October 2012 to February 2015.

Inclusion criteria

- All patients of all age group presenting with history of pathar dye poisoning.
- Patients with cervicofascial edema.

Exclusion criteria

- Patients who were not alive at the time of presentation in emergency department.
- The cases of self-harm by using the modalities i.e. firearm, hanging, drowning and accidental poisoning due to some other toxicant.

Procedure

In this study, a predesigned proforma was used to collect data including demographic features (age, sex, marital status, socio economic status), clinical features, laboratory findings, mode of intoxication (accidental or suicide). The diagnosis of PPD poisoning was based on clinical findings and information taken from the patient's family.

All patients received therapeutic measures included gastric lavage, anti-histamines, parenteral steroids, inhaled salbutamol, broad spectrum antibiotics, IV fluids and alkaline diuresis.

In Patients with severe cervicofascial edema and stridor, tracheostomy was done and in those patients in whom edema was not much, intubation was done. Morbidity and mortality rates were also recorded.

Attendants were counseled and recovered patients were referred to psychiatry department for psychiatric assessment.

Recorded and collected data was classified, tabulated and analyzed using SPSS (trial) version 16.0 and conclusions were drawn accordingly.

RESULTS

In this study 165 patients presented with hair dye (PPD) poisoning out of whom 124 were females and 41 males. Male to female ratio was 1:3.02. Majority of patients

were of age group between 11-20 (50.90%) followed by 21-30 (35.15%). Mean age was 23.69 ± 8.01 . Youngest patient was of 14 years and oldest reported was 48 years (Table 1).

Table 1: Age and sex distribution of patients.

Age in years	Male	Female	Total
0-10	0	0	0
11-20	18	66	84
21-30	16	42	58
31-40	4	8	12
41-50	3	8	11
>50	0	0	0
Total	41	124	165

Out of 165, all were suicidal and in all mode of intoxication was oral ingestion. Most of them gave history of ingesting Godrej hair dye and Supervasmol hair dye for the purpose of self harm.

Among females 48.38% of the females were housewives and 41.93% were students rest of the females worked in small scale industries or as domestic help. In males 51.21% were working, 29.26% males were students and 19.51% were unemployed

Most common reason for suicide was domestic violence (23.47%) were males and 88 (76.52%) were females followed by other social problems (Table 2).

Table 2: Reason for suicide.

Reason	Number	Percentage (%)
Exam pressure	20	12.12
Domestic violence	64	38.78
Financial problems	26	15.75
Love affairs	32	19.39
Chronic illness	10	6.06
Other social problems	13	7.87

Table 3: Distribution of clinical features among patients.

Clinical features	Number	Percentage (%)
Cervicofascial edema	146	88.48
Throat pain	120	72.72
Stridor	101	61.21
Change in voice	138	83.63
Dysphagia	140	84.84
Difficulty in opening mouth	144	87.27

Volume of consumption of dye was 50-150 ml. Almost all the patients presented with cervicofacial edema (88.48%), change in voice was seen in 83.63%. 61.2% presented with stridor. 72.72% patient complained of throat pain (Table 3).

Tracheostomy was needed in 115 (69.69%). Among 115,

27 tracheostomy done, 2 patients died at the time of tracheostomy due to severe stridor. 16 patients developed post tracheostomy complication. 10 (8.6%) patient developed post tracheostomy tracheoesophageal fistula and 6 (5.21%) patients suffered from wound infection. Outcome and need of tracheostomy depends on time of presentation and volume consumed of dye (Table 4).

Table 4: Outcome of patients according to time of presentation and volume consumed.

Time of presentation	<3 hrs	3-6 hrs	6-9 hrs	9-12 hrs	>12 hrs
Number	36	48	46	10	25
Volume consumed	90.25±43.07	81.56±45.59	93.80±52.54	77.5±32.16	83.2±37.21
Intubation done	14	12	3	-	-
Tracheostomy done	15	31	40	8	18
Expired within 24 hrs of presentation	1	3	2	-	1
Expired after 24 hrs of presentation	-	4	7	1	12

Table 5: Outcome of patients on the basis of tracheostomy.

	Tracheostomy done	Non tracheostomy	Total
Alive	108	36	144
Expired	7	14	21
Total	115	50	165

Maximum patients presented within 10 hours of ingestion of dye. 21 (12.72%) patients expired. 2 (9.5%) patient died due to stridor while 19 (90.47%) patient expired due to cardiac and renal complications.

Out of 115, tracheostomy done 108 patients were alive and 7 expired while patients in whom tracheostomy was not done 36 were alive and 14 died (Table 5).

DISCUSSION

PPD poisoning in the form of compound hair dye known as 'kala pathar' is emerging as a new trend in suicidal poisoning in our setting because of easy availability, low cost and salty taste rather than bitter.⁷ The constituents of 'kala patar' include 4% PPD, resorcinol, propylene glycol, ethylenediaminetetraacetic acid (EDTA), sodium, liquid paraffin, cetostearyl alcohol, sodium lauryl sulphate, herbal extracts, preservatives, and perfumes. Some of these are known toxins with systemic effects, while the toxicity profile of others is not known.⁸ The toxic effects depend on the dosage.⁹

Majority of patients in our study was young females in age group of 11-20 yrs and mean age was 23.69±8.01. This is similar to many studies done before like khuhro BA et al found mean age to be 25.87±5.59 an Akbar MA et al found 20.5±4.65 years.^{7,10} Male to female ratio in our study came out to be 1:3.02.

Most important provocative factor for suicide in our study was domestic violence (38.78%) followed by due to broken love affairs (19.39%). Cervicofacial edema was the first symptom to develop as observed in studies by Khuhro et al (100%) and Kallel et al (79%).^{7,11} similar results were seen in our study where 88.48% patient presented with cervicofacial edema.

Respiratory distress after poisoning is the main immediate threat to patient's life for this immediate intubation and tracheostomy was done to secure airway. in our study tracheostomy was done in 69.69%.this result is quite similar to studies done by Akbar (60%).study done by Nirmala et al show a decrease rate (30.55%) of tracheostomy than our study.^{10,12}

Morbidity and mortality rates are high once renal failure develops. Mortality rates vary between 0.03%- 60%.⁶ High mortality within 24 hrs was noted in Hashim et al study 41% (13 out of 31).¹³ In our study, the proportion of mortality in 165 patients is 21 (12.72 %), in tracheostomy patients 7 (6.08%) and in non tracheostomy patients 14 (28%). In study by Nirmala the proportion of mortality in 108 patients is 24 (22.2 %), in tracheostomy patients 7 (21.2%) and in non tracheostomy patients 17 (22.7%).¹²

The mortality in our patients is more in group of patients who presented after 24 hours and non tracheostomised patients. Most of the patients who died after 24 hours had

developed acute renal failure. PPD produces local as well as systemic toxic effects when applied topically and/or ingested. It is highly toxic when taken by mouth and the outcome depends mainly on the dose taken. The lethal dose of PPD is not known; estimates vary from 7-10 g.¹⁴ No specific antidote is available.¹⁵

Early therapy with tracheostomy and aggressive forced diuresis are essential in order to prevent the high mortality associated with this toxin.

CONCLUSION

Paraphenylenediamine (PPD) (kala pathar) poisoning could be a warning to the Asian countries and emerging as alternative to organophosphorus poisoning because of its easy availability, low cost and less bitterness. PPD poisoning is a medical emergency and has high mortality if not recognized and intervened early. There is no specific antidote but the most important aspect of management is early recognition and supportive measures that include gastric lavage, normal saline and sodium bicarbonate infusion. Respiratory distress, myocarditis and cardiac arrhythmias are the major early challenges, which require vigilant monitoring to prevent early deaths. Tracheostomy, intubation and ventilator support may be required for asphyxia and all modalities of dialysis have been found useful in renal failure.

It is a major emerging health problem with high mortality. It is imperative to raise public awareness of the potential toxicity of the dye as well as to educate physicians about the need for aggressive and early treatment.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Kumar KS, Yesudas S. Hair Dye Poisoning and the Developing World. *J Emerg Trauma Shock.* 2009;2(2):129-31.
2. Paris J. Chronic suicidality among patients with borderline personality disorder. *Psychiatric Services (Washington, D.C.).* 2002;53(6):738-42.
3. Värnik P. Suicide in the World. *International Journal of Environmental Research and Public Health.* 2012;9(3):760-71.
4. Srinivas Rao Ch, Venkateswarlu V, Surender T, Eddleston M, Buckley NA. Pesticide poisoning in south India: opportunities for prevention and improved medical management. *Trop Med Int Health.* 2005;10:581-8.
5. Chrispal A, Begum A, Ramya I, 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(2):100-3.
6. Sampathkumar K, Sooraj Yesudas S. Hair dye poisoning and the developing world. *J Emerg Trauma Shock.* 2009;2(2):129-31.
7. Khuhro BA. Diamine poisoning: our experience at PMC Hospital Nawabshah. *Anesth.* 2012;16(3):243-6.
8. Nohynek GJ, Fautz RF, Benech-Kieffer, Toutain H. Toxicity and human health risk of hair dyes. *Food and Chemical Toxicology* 2004;42(4):517-543.
9. Hou FQ, Lin XH, Yu YY, Wang TL, Wang GQ. Severe liver injury induced by repeated use of hair dye. *Chinese Medical J.* 2009;122 (7):875-77.
10. Akbar MA, Khaliq SA, Malik NA, Shahzad A, Tarin SM, Chaudhary GM. Kala Pathar Paraphenylenediamine intoxication; a study at Nishtar Hospital Multan. *Nishtar Med J.* 2010;2:111-5.
11. Kallel H, Chelly H, Dammak H, Bahloul M, Ksibi H, Hamida CB, et al. Clinical Manifestations of Systemic Para-phenylenediamine Intoxication. *J Nephrol.* 2005;18:308.
12. Nirmala M, Ganesh R. Hair dye - an emerging suicidal agent: our experience. *Online J Otolaryngol.* 2012;(2):163-80.
13. Sir Hashim M, Hamza YO, Yahia B, Khogali FM, Sulieman GI. Poisoning from henna dye and paraphenylenediamine mixture in children in Khartoum. *Ann Tro Paediatr.* 1992;12(1):3-6.
14. Chaudhary SC, Salwani KK, Singh K. Paraphenylenediamine poisoning. *Niger J Clin Pract.* 2013;16:258-9
15. Srikanth A, Babu C. Treatment modalities of hair dye poisoning. *Indian Med Updates.* 2011;34(6):1-4.

Cite this article as: Nautiyal S, Tiwari S, Ashutosh K. Pathar dye (paraphenylenediamine) poisoning: our experience of this lethal emerging health problem in a tertiary care centre. *Int J Otorhinolaryngol Head Neck Surg* 2017;3:1056-9.