Original Article

Incidence of Paraphenylenediamine (Blackstone) Intoxication as A Suicidal Poison in Interior Sindh

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ABSTRACT

Objective: The study was aimed to see the incidence of this poisoning.
Study Design: Retrospective study.
Place and Duration of Study: This study was conducted at the Peoples University of Medical and Health Sciences for Women, Nawabshah over a period of 3years from January, 2013 to December 2015.
Material and Methods: The study was based upon the data of 235 female cases of PPD poisoning extracted from the medical records of Surgical Intensive Care Unit at PUMHSW.
Results: During the period of study a total of 235 female cases of PPD poisoning were reported in the hospital. The mean age of study population was 24.47±9.88 years. Regarding the outcomes 54.9% patients were cured, 38.3% expired & 6.8% were referred.
Conclusion: The study revealed that number of cases using hair dyes for commission of suicide is significant and alarming. It is recommended that use of Blackstone (paraphenylenediamine) in hair dyes or in other cosmetics must be discouraged.
Key Words: Hair Dye, Paraphenylenediamine, Poisoning.

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INTRODUCTION

Hair dye poisoning has been evolving as one of the significant causes of intentional self-harm in the developing world. Hair dyes contain Paraphenylenediamine (PPD) / Blackstone which is a toxic compound which causes laryngeal edema, severe metabolic acidosis, rhabdomyolysis and acute renal failure.[24]Paraphenylenediamine (PPD) [C6H4 (NH2)2] is an aromatic amine not found in nature and it is produced commercially. It is a derivative of Paranitroanaline that is available in the form of white crystals when pure and rapidly turns to brown when exposed to air. It is widely used in industrial products such as textile or fur dyes, dark colored cosmetics, temporary tattoos, photographic development and lithography plates, photocopying and printing inks, black rubber, oils, greases and gasoline.

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PPD is the most common constituent of hair dye formulations. It is often the key ingredient but can also be used for color enhancement. PPD is commonly used in its raw form for cosmetic purposes in Africa, Middle East and Indian subcontinent while it is rarely used in the West. The salt concentration in hair dye preparations variesbetween70-90%. PPD has widely been used for cosmetic and industrial purposes in the world.[1-5]

PPD on oxidation yields an intermediate, Bandrowski's base, which is a highly toxic compound and a well-known mutagen and carcinogen. However, the systemic side effects produced by PPD are dose-dependent and based on potential of individual susceptibility.[7, 8]

It has potential to damage multiple systems of the body including respiratory, renal,vascular and integumentary, consequently resulting into reports of increased mortality rates.[5,7]

Several studies from Saudi Arabia, India, Khartoum, Sudan, Casablanca, Morocco and Pakistan have reported cases of PPD poisoning.[9,10] According to a study by Raheem et al, mortality rate from PPD poisoning was between 12-42%,while it was between 3-60% in another study.[1,5] Previous researches have reported that the PPD poisoning is common in young people particularly aged between 15-

35 years with a higher proportion amongst females.[11] Tilldate, there isno antidote for PPD poisoning and it is managed conservatively, with increased mortality rate within 24 hours of consumption. Recently, few studies have been conducted in Pakistan on PPD poisoning [11,12] buttheywere general and did not particularly address female youngsters. However, this study aims specifically on female population suffering PPD poisoning and also gives outcome of these cases.

MATERIALS AND METHODS

This retrospective study is based upon the data extracted from the medical records of Surgical Intensive Care Unit at Peoples University of Medical and Health Sciences for Women, Nawabshah over a period of 3years (January,2013-December 2015). The details of females with PPDpoisoning were recorded. The children, males and other causes of poisoning were excluded from the study. Variable under study were age, sex and manner of death. Information on post-referral state of the patient was neither obtained nor documented in the medical records. All the patients were initially managed at the trauma center PUMHS (Women), Shaheed Benazeerabad then shifted to Surgical Intensive care unit. Since there is no antidote for this poison, all the cases were managed conservatively including correction of fluid and electrolyte imbalance, blood pressure control and nutritional support. The data extracted from medical records was transferred to Microsoft Excel 2007 spreadsheets and analyzed on SPSS version 20. Categorical variables were presented as frequencies and percentage.

RESULTS

During the3 years period of study (January, 2013-December, 2015), there were a total of 235 female cases of PPD poisoning. The age of study population was24.47±9.88 years.

Table No.1: Frequency distribution of victims with reference to outcome

Outcome	Frequency	Percentage	Manner of Death
Cured	129	54.90	Suicide
Expired	90	38.30	Suicide
Referred	16	6.80	
Total Number	235	100.00	

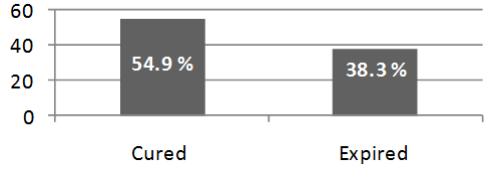

Figure No. 1: Outcome of PPD poisoning cases.

In context to the outcomes, 54.9% patients were cured and 38.3%expired.(Figure No. 1 and Table No.1)

DISCUSSION

Poisoning is the most common method of committing suicide in Asian countries with the use of various methods due to immense variation insocial, religious, cultural, and economic backgrounds.[13,14]Intherecent years, prevalence of cases of PPD poisoning have significantly increased with major involvement of young females. Easy access to the poison, prevalence of family issues and conflicts, employment issues, social and emotional problems, low socioeconomic status, and conflicts related to marriage might be the most likely factors for such an increase in the cases of PPD poisoning.[15]

During the period of study we had a total of 235 cases of females with PPD poisoning. This is in accord with study of Chrispal et al who also reported female predominance (11out of 13). In another study, females contributed to 64.8% with the female to male ratio of 1.84.

In two recent studies poisoning in young girls has been reported[17,18]. In eleven years study (1992 to 2002) of Filali et al, in total of 374cases, majority were females (77%)with age ranging between 15-35 years (69.5%) & 78.1% cases were of intentionalpoisoning.[19]

The female predominance in the study of Hamdouk was 69.7%, and of Jain et al was 74.86%.[17,19,20]

The age of victims in our study was 24.47±9.88 years. In study of Chrispal et al the mean age was 27.75 years.[16] In another study PPD poisonings was observed among young people aged between 15-24 years[19]. These findings corroborated with previous study with mean age of 24.75 years.[9]

In context to the outcomes, there were 54.9% patients cured and 38.3% cases expired during three years. In a previous study, the mortality rate due to PPD poisoning was 42% with all deaths occurring within 24 hours of diagnosis.[21] In the study of Abdul Rahim et al the reported mortality rate was 7.9%,[11]

In study of Filali et al the mortality rate reported was 21.1%. Similarly, in the cases of PPD poisoning reported by Rebgui et al and Shalaby et al the mortality rates respectively were 14.7% and 16%[22,23]. This variation in the mortality rates may be attributed to the difference in the duration of the study, variation in sample size and the type of methodology used, so also geographical variation.

CONCLUSION

The study revealed that number of cases using hair dyes for commission of suicide is significant and alarming. It is recommended that use of blackstone (paraphenylenediamine) in hair dyes or in other cosmetics must be discouraged.

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Sampath kumar K, Yesudas S. Hair dyepoisoning and the developing world. J Emergencies Trauma Shock 2009;2(2):129.
2. KangI J, Lee MH. Quantification of para-phenylenediamine and heavy metals in henna dye. Contact Dermatitis 2006;55(1):26-9
3. Alalwani AD. Histopathological Examination of ParaphenylenDiamine Toxicity in Female Rats Liver. IRCST - Engineering Science and Technology:An Int J (ESTIJ) 2013;3(2):296-302.
4. Bhargava P, Matthew P. Hair dye poisoning. J Assoc Physicians Ind 2007;55:871,
5. Abdelraheem M, Hamdouk M, Zijlstra EE. Review: ParaphenyleneDiamine (Hair Dye) Poisoning in Children. Arab J Nephrol Transplant 2010;3(1):39-44.
6. White J, Kullavanijaya P, Duangdeeden I, Zazzeroni R, Gilmour N, Basketter D, et al. p-Phenylenediamineallergy: the role of Bandrowski's base. Clin Experimental Allergy 2006; 36(10): 1289-93·
7. Kondle R, Pathapati RM, Saginela SK, Malliboina S, Makineedi VP. Clinicalprofile and outcomes of hair dye poisoning in a teaching hospital in Nellore. ISRN Emergency Medicine. 2012.
8. Nevo-Shor A, Abramovich E, Almog Y, Galante O. Laryngeal edema, rhabdomyolysis and acute renal failure following ingestion of "black [illegible]". Israel Med Assoc J 2013;15(8):451-
9. Mary NS, Ganesh R. Hair dye An emerging suicidal agent: Our experience. Online J Otolaryngol 2012;2(2):3.
10. Reddenna L, Krishna TR, Basha SA. Paraphenylenediamine Poisoning: A Review of Literature. Research & Reviews. J Toxicol 2014;3(3):17-24.
11. Solangi AR, Khaskheli MS, Tabassum R, Memon AR. ParaphenyleneDiamine Poisoning and its Laboratory Profile in Nawabshah, Pakistan: A Descriptive Study. J Peoples University of Medical & Health Sciences (JPUMHS) 2015;5(1):11-7.
12. Sahito AA, Khaskheli MS, Tabassum R, Memon AR. ParaphenyleneDiamine Poisoning in Nawabshah, Pakistan From 2011 to2014: Trend &Outcomes. J Peoples University of Medical & Health Sciences (JPUMHS) 2015;5(3):137-42.
13. Chen YY, Chien-Chang Wu K, Yousuf S, Yip PS. Suicide in Asia: Opportunities and Challenges. Epidemiologic reviews 2012;34(1):129-44.
14. Wu KCC, Chen YY, Yin PS. Suicide Methods in Asia: Implications in Suicide Prevention. Int J Environmental Res and Pub Health 2012;9(4): 1135-58.
15. Peshin SS, Srivastava A, Halder N, Gupta YK. Pesticide poisoning trend analysis of years: A retrospective study based on telephone calls at the National Poisons Information Centre, All India Institute of Medical Sciences, New Delhi. J Forensic Legal Med 2014; 22:57-61.
16. Chrispal A, Begum A, Ramya I, Zachariah A. Hair dyepoisoning-an emerging problem in the tropics: an experience from a tertiary care hospital in South India. Tropical doctor 2010; 40(2):100-3·
17. Jain P, Agarwal N, Kumar P, Sengar N, Agarwal N, Akhtar A. Hair dye poisoning in Bundelkh and region (prospective analysis of hair dye poisoning cases presented in Department of Medicine, MLB Medical College, Jhansi)..J Assoc Physicians Ind 2011;59(7):415-9.
18. Ahmed SN, Jayasundaram E, Reddy SV, Babu C, editors. Airway Management in Hair Dye Poisoning: Our Experiences.2012.
19. Filali A, Semlali I, Ottaviano V, Furnari C, Corradini D, Soulaymani R. A restrospective study of acute systemic poisoning of paraphenylenediamine (Occidental Takawt) in Morocco. Afri J Traditional Complementary and Alternative Med 2006;3(1):142-9.
20. Hamdouk MI, Abdelraheem MB, Taha AA, Benghanem M, Broe ME. Paraphenylene diamine hair dye poisoning. Clin Nephrotoxins: Springer US;2008.p.871-9.
21. Hashim M, Hamza Y, Yahia B, Khogali F, Sulieman G. Poisoning from henna dye and para-phenylenediaminemixtures in children in Khartoum. Annalsoftropical paediatrics 991;12(1):3-6.
22. Rebgui H, Hami H, Ouammi L, Soulaymani A, R Soulaymani-Bencheikh, AM. Epidemiological profile of acute intoxication 'with para-phenylenediamine(Occidental TJ>.J:(A'VvT) in the Oriental region in Morocco: 1996-2007- IOSR J Environmental Science, Toxicology and Food Technology (IOSR-JESTFT) 2013;4(6):67-72.
23. Shalaby SA, Elmasry MK, Abd-Elrahman AE, Abd-Elkarim MA, Abd-Elhaleem ZA. Clinical profile of acute paraphenylenediamine intoxication in Egypt Toxicology and Industrial Health 2010;26(2):81-7.
24. Punjani NS. ParaphenyleneDiamine (Hair Dye) Poisoning Leading to Critical Illness Neuropathy. J Neurol Disord 2014;2:180-1.