ORIGINAL ARTICLE

Paraphenylenediamine Poisoning and Recovery from Acute Renal Failure Subsequent to Haemodialysis

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ABSTRACT

Objective: To determine the frequency of nephrotoxicity and recovery from Acute renal failure subsequent to Haemo dialysis in patients with diaphenylparamine poisoning

Methods: Our study is a transversal study, accomplished in Peoples Medical College Hospital, Nawabshah. Medical wards & Intensive care unit (ICU) were surveyed for a period of 6 months. 99 patients with Para-phenylenediamine poisoning duration of ingestion or exposure more than 12 hours having acute renal failure were selected with early Haemodialysis.

Results: It revealedOut of 99 patients, there are 40 male cases and 59 are females. The average age of the patients was34 ± 5yrs. A high recovery rate is also observed in both the genders following Haemodialysis .The death rate was 29% .

Conclusion: Early management and early Haemo dialysis in acute kidney failure can decrease the mortality associated with PPD poisoning. . A greater importance should be given to spot the locale of use of hair dyes containing PPD so as to control and overcome serious complications related to PPD poisoning in our social order.

Keywords: Hair dye poisoning, Paraphenylenediamine, Acute renal failure, Nephrotoxicity, Haemodialysis.

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INTRODUCTION:

Paraphenylenediamine PPD is a major cause of hair dye toxicity.[1] Many of the studies accounts for fatal complications such as liver toxicity, renal toxicity, rhabdomyolysis, angioedema, and respiratory collapse.[2] Scucidal attempts are also reported in young generation of south Asian region.[3] Allergic reactions to skin such as rash, dermatitis, swelling and eye irritation, too much tears discharge and blindness is also reported.[4-6]

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The toxic dose is exactly unknown but amount greater than 7-10 grams is usually associated with fatal outcomes.[7] Development of highly Nephrotoxic qunione-di-amine, heart and skeleton muscles necrosis, Kidney tubular occulusion because of mayoglobin casts could be amplified pathophysiological mechanism.[8-10] There is no particular antidote for Paraphenylenediamine complications and management such as stomach saline wash and bicarbonate infusion is mostly helpful.[11] Hashim M, et al in their study reported hospitalization of 31 Sudanese children after getting exposed to para-phenylenediamine during five years from 1984 to 1989. Acute renal failure was observed in most of the children that improved after peritoneal dialysis. Mortality rate was high.[12] Hamdouk M et al reported renal impairment, proteinuria and hematuria in hair dressers using Paraphenylenediamine dye in pure

forms for a longer duration of time. Elevated levels of serum creatinine were also observed.[13] Kumar AP et al reported a case report suicidal attempt by ingesting hair dye containing PPD. cervicofascial edema, rhabdomyolysis and acute kidney failure was observed. Acute renal failure was setteled in more than 6 days with dialysis has been observed by Kumar AP et al.[14] Bai YH et al in his research reported nephrotoxic effects of PPD in human and animals. Acute tubular necrosis and renal failure was observed after ingestion or topical use of PPD and aggravate membranous nephropathy.[15]

The rationale of our study is to diagnose the patients with Nephrotoxicity and Acute Renal failure that may benefit from early dialysis, and could be saved them from fatal complications.

METHODS:

Our study is a transversal study, accomplished in Peoples Medical College Hospital, Nawabshah. Medical wards & Intensive care unit (ICU) were surveyed for a period of 6 months. 99 patients with Para-phenylenediamine poisoning duration of ingestion or exposure more than 12 hours and less than 72 hours were selected having acute renal failure. Age group was between 20-50 years, both Male and female patients with Para-phenylenediamine poisoning were included in the study. Patients with other medical conditions or taking other medicines along with PPD were excluded from study.

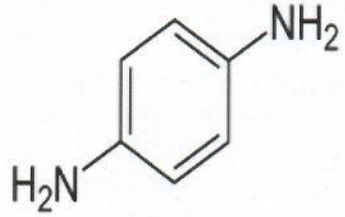
The data was collected from patients after the authorization from the ethical committee of the Hospital and their relatives .Patients in Medical ward & Intensive care unit meeting the inclusion norm were selected. Researcher obtained the written informed consent from the patient or next to relations. Confidentiality of the specified information was assured and maintained. After getting admit to medical ward/ICU patient was managed with Haemodialysis were pursued till 7 days to evaluate the recovery rate. Performa was filled accordingly.

SPSS.20 was used to perform the statistical analysis. Mean +/- standard deviation was intended as of age of patient, plus interval of intake and ICU condition. Frequency for recovery after Haemodialysis for gender, group of people with different age and time period for intake of PPD was calculated. Chi-squared test was applied taking P value <0.05 as significant.

RESULTS:

40 male cases and 59 females were observed. The mean age of the patient was 34 with a standard deviation of ± 5. The standard age among both the genders was almost the same. (Figure 1) The average time period of ingestion of PPD was 61 hours with a standard deviation of ± 5 hrs. The recovery rate was good in both the age group i.e. between 20-35yrs 38 patients recover and 32 patients recovered in between age group of 36-50yrs after Haemodialysis. A high recovery rate was also observed in both the genders, 30 males and 40 females were recovered following Haemo dialysis. (Table 2).

Table 1: Physical and Chemical Description of Paraphenylenediamine

IUPAC Name	Benzene-1,4-diamine
Formula	$C_6H_4(NH_2)_2$
Atomic Weight	108 Dalton
Physical State	White to Light Purple Powder
Boiling Point	267°C
Structure	

Out of 99 patients only 70 patients recovered following Haemodialysis , rest of the patients suffered severe complications like cardiac arrhythmias and Line sepsis that lead to death showing a 29% mortality rate. The chi square gives significant correlation by means of Acute Renal failure patients and duration of ingestion. On the other hand the other variables like age and gender did not showed significant correlation (Table 2).

Table 2. Demographic Variables and Recovery Rate after Dialysis.

	Recovery After Dialysis		
Variables	No	Yes	P. Value
Age in yrs			
20-35yrs	12	38	0.077
36-50yrs	17	32	
Gender			
Male	10	30	0.65
Female	19	40	
Duration of ingestion> 12hrs	29	70	0.000
Acute Renal Failure	29	70	0.000

DISCUSSION:

A coal tar derivative (PPD),on oxidation gives Bonddrowski's base, the reaction is highly allergenic, mutagenic and lethal.[16] The Physical and Chemical description of Paraphenylene-diamine is given in Table 1. Acute renal failure in the poisoning with PPD produces the severe angioneurotic edema, intravascular hemolysis thus hemoglobinuria.[17] All through in emergency and laboratory related issues where facilities are always lacking, neck and face angioedema having difficulty in breathing can be noticed.[18-20] Consideration must be given regarding cardiac manifestation and other complication related to PPD poisoning. In acute kidney failure haemodialysis, peritoneal dialysis and continuous renal replacement therapy have been attempted and have been found to be useful.[21] In our study the patient's average age was usually 34 yrs with a standard deviation of ± 5 with male and female case was nearly the same where as female cases predominance. However the recovery rate was good in both the age group following Haemo-dialysis and mortality rate was 29% . Ayoub Filali reported mortality of 21.1% in Morrocco[1]. He also reported mortality even with smaller quantity of dye poisoning.Khuoro et al had also reported increased predominance of poisoning in females of younger age[21].

In our study a high recovery rate is also observed in both the genders as well. ARF was observed in nearly all the cases. Anuradha S, reported a case of systemic poisoning with PPD with severe angioneurotic edema, rhabdomyolysis and intravascular hemolysis, hemoglobinuria with acute renal failure.[22] In our study all the cases showed ARF although recovery rate was good following Haemodialysis. In Tunisia Kallel *et al.*, reported chocolate-brown colored urine , oliguria subsequent to ARF in 19 cases with PPD poisoning.[23] Suliman *et al.* , studied 150 cases of PPD poisoning in Sudan majority of the patients had ARF requiring dialysis while a few had ARF which recovered with conventional procedures where as All of the patients recovered renal function after 15 days of dialysis.[24] A greater importance should be given to spot the locale of use of hair dyes containing PPD so as to control and overcome the high serious complications related to PPD poisoning in our social order. There is no specific anidote, to overcome the complications is the major early confront, which require cautious monitoring to prevent early deaths. Dialysis has been found helpful in renal failure. ARF manifesting as chocolate brown-colored urine could be suggestive of PPD poisoning.

CONCLUSION:

Early management and early Haemo-dialysis in acute renal failure can decrease the high mortality associated with PPD poisoning. A greater importance should be given to spot the locale of use of hair dyes containing PPD so as to control and overcome serious complications related to PPD poisoning in our social order. Public awareness programs are obligatory to control *p*-Phenylene-di-amine toxicity.

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