

# Acute Hepatitis in Cases of Paraphenylenediamine (PPD) Poisoning at Tertiary Care Hospital

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## ABSTRACT

**Aim:** To determine the frequency of acute hepatitis in cases of paraphenylenediamine (PPD) poisoning at tertiary care hospital.

**Methods:** This cross sectional study was conducted at Department of Medicine, Sahiwal Medical College, Sahiwal from March 2019 to September 2019 over the period of 6 months. Total 163 patients following PPD intoxication taken within 24 hours having age 20-60 years either male or female were selected. Base line investigations were done for all selected patients and demographic profile of the patients were recorded in pre-designed proforma. 5ml blood sample was taken for serum ALT and sent to laboratory for assessment of acute hepatitis.

**Results:** Total 163 patients with PPD intoxication were selected and acute hepatitis was studied. Mean age of the patients was  $41.63 \pm 11.69$  years. Out of 163 patients, acute hepatitis was noted in 109 (67%) patients. Male patients were 63 (38.65%) and female patients were 100 (61.35%) and acute hepatitis was found in 44 (69.84%) male patients and 65 (65%) female patients. Association of acute hepatitis with gender was found statistically insignificant with p value 0.523. Among 69 (42.33%) patients, duration of PPD intoxication was 1-12 hours and in 94 (57.67%) was 13-24 hours. Acute hepatitis was noted in 46 (66.67%) patients of 1-12 hours group and in 63 (67.02%) patients of 13-24 hours group. But association between acute hepatitis and duration of PPD intoxication was statistically insignificant with p value 0.962.

**Conclusion:** Results of present study showed that most of the patients were female as compared to male patients with PPD poisoning. Higher rate of acute hepatitis was noted. No association of acute hepatitis with age, gender, duration of PPD poisoning and socioeconomic status. Most of the patients were married and middle pass.

**Keywords:** Acute hepatitis, Suicide, PPD ingestion, Kala Pathar, hair dye

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## INTRODUCTION

A common preventable health problem is suicide, there has been a 60% increase in suicide rate over the last half century in developing countries and now it results in one million suicides every year. <sup>1</sup>Majority of suicide cases faced by emergency departments are due to self-poisoning. <sup>2</sup>Poisoning by common hair dye Paraphenylenediamine (PPD) is a new homicidal trend in Africa and Asia with high mortality rates. <sup>3</sup>Kala pathar (containing PPD) is used to enhance hair color by mixing heena with it. <sup>4</sup>Various organs show symptoms due to PPD ingestion. <sup>5</sup>Chemically, it is a derivative of paraphenyleniline, white crystalline solid that darkens upon exposure to air, easily soluble in hydrogen peroxide and 10% at 40 C°, 87% at 107C°, 100% at 140 C° in water. <sup>6</sup> PPD is formed into benzoquinone diamine when cytochrome P450 peroxidase metabolizes PPD by electron oxidation to an active radical due to it being a good hydrogen donor. <sup>7</sup>Brandowaski's base (known to cause mutation and anaphylaxis) can further oxidized it. <sup>8</sup> Initially a quick development of edema of the tongue, larynx, pharynx, face and neck which is followed by acute renal failure due to PPD ingestion. <sup>9</sup>High toxicity of PPD causes angioneurotic edema which causes death within 24 hour of ingestion. Moderate and small doses of PPD causes acute renal failure and angioneurotic edema and hepatitis respectively. No antidote is available for PPD poisoning yet<sup>10</sup>.

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Findings of present study may help us for early management of hepatitis in cases of PPD by early screening of hepatitis. So that to decrease the mortality and morbidity of such patients.

## OPERATIONAL DEFINITION

**Acute Hepatitis:** Defined as serum ALT >80 IU/L

**PPD intoxication:** Diagnosis of PPD poisoning was based on clinical presentation (neck swelling and/or cervicofacial edema with or without shortness of breath and/or black colour urine) and/or the information of intake of PPD provided by the family members or the patients themselves and/or by raised CPK levels. (Normal range of CPK = 10-120 mcg/L.)

## Socio-economical Status

**Poor:** having monthly income <20000

**Middle:** having monthly income 20000-50000

**High:** having monthly income >50000

## MATERIAL AND METHODS

This cross sectional study was conducted at Department of Medicine, Sahiwal Medical College, Sahiwal from March 2019 to September 2019 over the period of 6 months. Total 163 patients following PPD intoxication taken within 24 hours having age 20-60 years either male or female were selected. Patients who were received dead at the time of presentation in emergency department, cases of drowning, hanging and accidental poisoning patients with previous history of PPD poisoning and any other hepatotoxins in the last six months, patients taking ATT, methyl dopa, fenofibrate, anti-epileptic drugs and patients with viral

hepatitis B & C (confirmed by Elisa) were excluded from the study. Study was approved by the ethical committee of the institution and written informed consent was taken from every patient.

Base line investigations were done for all selected patients and demographic profile of the patients was recorded in pre-designed proforma. 5ml blood sample was taken for serum ALT and sent to laboratory for assessment of acute hepatitis. Findings were entered in pre-designed proforma. Patient's socio economic status, education level, marital status was also entered in proforma. All the patients were assessed for acute hepatitis and recorded in proforma.

Data was entered in computer software SPSS version 16. The quantitative variables of the study i.e. age and duration of poisoning were presented as Mean±SD. The qualitative variables like gender, frequency of acute hepatitis, socio economical status and marital status were presented as frequency and percentage. Stratification was done for age, gender, socio economic status and duration of poisoning. Post stratification chi-square test was applied. P. value ≤0.05 was considered as significance.

**RESULTS**

Total 163 patients with PPD intoxication were selected and acute hepatitis was studied. Mean age of the patients was 41.63 ± 11.69 years. Out of 163 patients, acute hepatitis was noted in 109 (67%) patients. (Fig. 1)

Age distribution of patients was done and two groups were made i.e. age group 20-40 years and age group 41-60 years. Total 68 (42%) patients belonged to age group 20-40 years and 95 (58%) patients belonged to age group 41-60 years. Out of 68 (41.72%) patients of age group 20-40 years, acute hepatitis was found in 44 (64.71%) patients. In age group 41-60 years, out of 95 (58.28%) patients, acute hepatitis was found in 65 (68.42%) patients. Association of acute hepatitis with age group was found statistically insignificant with p value 0.619. (Table 1)

Male patients were 63 (38.65%) and female patients were 100 (61.35%) and acute hepatitis was found in 44 (69.84%) male patients and 65 (65%) female patients. Association of acute hepatitis with gender was found statistically insignificant with p value 0.523 (Table 2).

Patients were divided into two groups according to duration of PPD intoxication i.e. 1-12 hours group and 13-24 hour group. Among 69 (42.33%) patients, duration of PPD intoxication was 1-12 hours and in 94 (57.67%) was 13-24 hours. Acute hepatitis was noted in 46 (66.67%) patients of 1-12 hours group and in 63 (67.02%) patients of 13-24 hours group. But association between acute hepatitis and duration of PPD intoxication was statistically insignificant with p value 0.962. (Table 3)

Total 90 (55%) patients were poor, 47 (29%) patients belonged to middle class and 26 (16%) patients belonged to high class. Acute hepatitis was seen in 57 (63.33%) poor patients followed by 32 (68.09%) middle class patients 20 (76.92%) patients of high class. But no association of acute hepatitis with socioeconomic status was detected with p value 0.422. (Table 4)

Total 115 (71%) patients were married and 48 (29%) patients were un-married. Total 90 (78.26%) married and 19 (39.58%) un-married patients found with acute hepatitis. Association of acute hepatitis with marital status was statistically significant with p value 0.000. (Table 5)

Fig. 1: Frequency of acute hepatitis

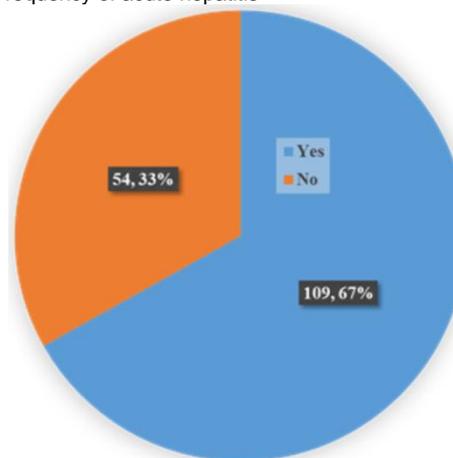


Table 1: Stratification for age

Age Group	Acute Hepatitis		Total	P value
	Yes	No		
20-40	44 (64.71)	24 (35.29)	68 (41.72)	0.619
41-60	65 (68.42)	30 (31.58)	95 (58.28)	
Total	109 (66.87)	54 (33.13)	163	

Table 2: Stratification for gender

Gender	Acute Hepatitis		Total	P value
	Yes	No		
Male	44 (69.84)	19 (30.16)	63 (38.65)	0.523
Female	65 (65)	35 (35)	100 (61.35)	
Total	109 (66.87)	54 (33.13)	163	

Table 3: Stratification for duration of PPD intoxication

Duration (Hours)	Acute Hepatitis		Total	P value
	Yes	No		
1-12	46 (66.67)	23 (33.33)	69 (42.33)	0.962
13-24	63 (67.02)	31 (32.98)	94 (57.67)	
Total	109 (66.87)	54 (33.13)	163	

Table 4: Stratification for socioeconomic status

Socioeconomic Status	Acute Hepatitis		Total	P value
	Yes	No		
Poor	57 (63.33)	33 (36.67)	90 (55.21)	0.422
Middle	32 (68.09)	15 (31.91)	47 (28.83)	
High	20 (76.92)	6 (18.75)	26 (15.95)	
Total	109 (66.87)	54 (33.13)	163	

Table 5: Stratification for marital status

Marital Status	Acute Hepatitis		Total	P value
	Yes	No		
Married	90 (78.26)	25 (21.74)	115 (70.55)	0.000
Un-married	19 (39.58)	29 (60.42)	48 (29.45)	
Total	109 (66.87)	54 (33.13)	163	

## DISCUSSION

PPD is cheaply used to dye fur and hair and is available over the counter.<sup>11</sup>The first case of PPD intoxication was reported in 1924 when toxicity was developed by barber while handling the dye.<sup>12</sup> Females are more vulnerable to PPD poisoning due to use of PPD for enhancing hair color and social pressure as compared to male in developing countries.<sup>13</sup>

In our study total 163 patients with PPD intoxication were selected and acute hepatitis was studied. Out of 163 patients, acute hepatitis was noted in 109 (67%) patients and mean age was  $41.63 \pm 11.69$  years. In one study by Iqbal et al,<sup>14</sup> mean age of patient of PPD intoxication was  $25.87 \pm 5.59$  years which is not correlates with our study. In study of Khuhro et al,<sup>15</sup> mean age of cases of PPD intoxication was  $25.87 \pm 5.59$  years.

In study of Iqbal et al,<sup>14</sup> 42 cases of PPD intoxication were admitted. These cases were assessed in terms of baseline characteristics, clinical presentation and consequences of PPD poisoning. In this study total 97.4% patients were found with acute hepatitis.

In one study by Ishtiaq et al,<sup>11</sup> out of 101 patients of PPD intoxication, acute hepatitis was found in 51% patients. In another study by Khuhro et al,<sup>15</sup> out of 16 patients of PPD intoxication, acute hepatitis was observed in 87.5% patients. Haider et al reported frequency of acute hepatitis in 18.75% patients of PPD poisoning.<sup>16</sup> Omer et al<sup>17</sup> reported acute hepatitis in 75% patients of PPD intoxication. Ansari et al<sup>18</sup> reported frequency of acute hepatitis as 48.1% patients of PPD poisoning. Naseem et al<sup>19</sup> reported frequency of acute hepatitis as 13.33% patients of PPD poisoning.

In study of Kondle<sup>20</sup> all the patients found with acute hepatitis which is much higher than our study. In current study male patients were 63 (38.65%) and female patients were 100 (61.35%). In study of Iqbal et al<sup>14</sup> male patients were 31% female patients were 66.7%. Male to female ratio of our study is in accordance with this study. Similarly in study of Khuhro et al,<sup>15</sup> a majority of the patients were young females (21-30 years) and belonged to a low socioeconomic class. While in our study total 90 (55%) patients were poor, 47 (29%) patients belonged to middle class and 26 (16%) patients belonged to high class.

## CONCLUSION

Results of present study showed that most of the patients were female as compared to male patients with PPD

poisoning. Higher rate of acute hepatitis was noted. No association of acute hepatitis with age, gender, duration of PPD poisoning and socioeconomic status. Most of the patients were married and middle pass.

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