ORIGINAL RESEARCH

Assessment of effects of Succimer and Penicillamine on acute lead poisoning patients

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ABSTRACT
Background*: Lead is among the oldest known toxins; lead poisoning is a dangerous environmental and occupational disease. The present study was conducted to assess effects of Succimer and Penicillamine on acute lead poisoning patients.*
Materials & Methods: *75 patients of acute lead poisoning of both genders were divided into 3 groups of 25 each. Group I received D-Penicillamine (250 mg every 6hours orally for two weeks), group II D-Penicillamine with succimer (250 mg every 6hours orally for two weeks + 200mg every 6 hours orally for two weeks and group III succimer(10 mg/kg for the first 5 days every 8 hours, then every12 hours up to 14 days). Parameters such as symptoms, length of hospitalization (day), blood pressure, heart rate and outcome of the treatment was recorded.*
Results*: Symptoms observed were nausea & vomiting in 12, 8 and 7, abdominal pain in 15, 11 and 9, constipationin 10, 12 and 11, fever in 9, 3 and 8, skin rash in 11, 7 and 9 and weak plantar reflex in 13, 11 and 10. Outcome was recovery in 23, 25 and 25 and death in 2 in group I, group II and group III respectively.The mean length of hospitalization was 2.7 days in group I, 3.9 days in group II and 3.5 days in group III. Systolic blood pressure was 134.2 mm Hg in group I, 130.2mm Hg in group II and 132.6mm Hg in group III. Diastolic blood pressure was 84.5 mm Hg in group I, 80.2mm Hg in group II and 82.6mm Hg in group III. Heart rate (beats/minute) was 90.2, 88.4 and 90.8 in in group I, II and III respectively. The difference was non- significant (P> 0.05).*
Conclusion*: Succimer and Penicillaminefound to be equally effective in acute lead poisoning patients.*
Key words: *Lead, Succimer, Penicillamine*

INTRODUCTION

Lead is among the oldest known toxins; lead poisoning is a dangerous environmental and occupational disease.[1] It is more common and severe in developing countries. In the past 6 years, we have encountered a high prevalence of lead poisoning among opium users, especially its oral consumption.[2]

Human exposure to lead and its compounds occurs mostly in lead related occupations with various sources like leaded gasoline, industrial processes such as smelting of lead and its combustion, pottery, boat building, lead based painting, lead containing pipes, battery recycling, grids, arm industry, pigments, printing of books, etc.[3,4]

Numerous studies have investigated the potential association between blood lead levels and various diseases in children and adults.[5] The level of lead in blood and tissues, as well as the duration of exposure, could determine its toxicity.Succimersuggested drugs in lead poisoning is a low-complication drug.[6] D-Penicillamine is a well-known lead chelator, used to be the first-line treatment in mild to moderate lead poisoning; currently, with the availability of other drugs, it is only used to treat copper, mercury, and arsenic poisoning.[7,8]The present study was conducted to assess effects of Succimer andPenicillamine on acute lead poisoning patients.

MATERIALS & METHODS

The present study comprised of 75 patients of acute lead poisoning of both genders. All gave their written consent for the participation in the study.

Data such as name, age, gender etc. was recorded. Patients were divided into 3 groups of 25 each. Group I received D-Penicillamine (250 mg every 6hours orally for two weeks), group II D-Penicillamine with succimer (250 mg every 6hours orally for two weeks + 200mg every 6 hours orally for two weeks and group III succimer(10 mg/kg for the first 5 days every 8 hours, then every12 hours up to 14 days). Parameters such as symptoms, length of hospitalization (day), blood pressure, heart rate and outcome of the treatment was recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II	Group III
Number	D-Penicillamine	D-Penicillamine with succimer	Succimer
M:F	14:11	12:13	11:14

Table I shows that group I had 14 males and 11 females, group II had 12 males and 13 females and group III had 11 males and 14 females.

Table II Assessment of parameters

Parameters	Variables	Group I	Group II	Group III	P value
Symptoms	Nausea & vomiting	12	8	7	0.21
	Abdominal pain	15	11	9	
	Constipation	10	12	11	
	Fever	9	3	8	
	Skin rash	11	7	9	
	Weak plantar reflex	13	11	10	
Outcome	Recovery	23	25	25	0.05
	Death	2	0	0	

Table II, graph I shows that symptoms observed were nausea & vomiting in 12, 8 and 7, abdominal pain in 15, 11 and 9, constipation in 10, 12 and 11, fever in 9, 3 and 8, skin rash in 11, 7 and 9 and weak plantar reflex in 13, 11 and 10. Outcome was recovery in 23, 25 and 25 and death in 2 in group I, group II and group III respectively. The difference was significant (P< 0.05).

Graph I: Assessment of parameters

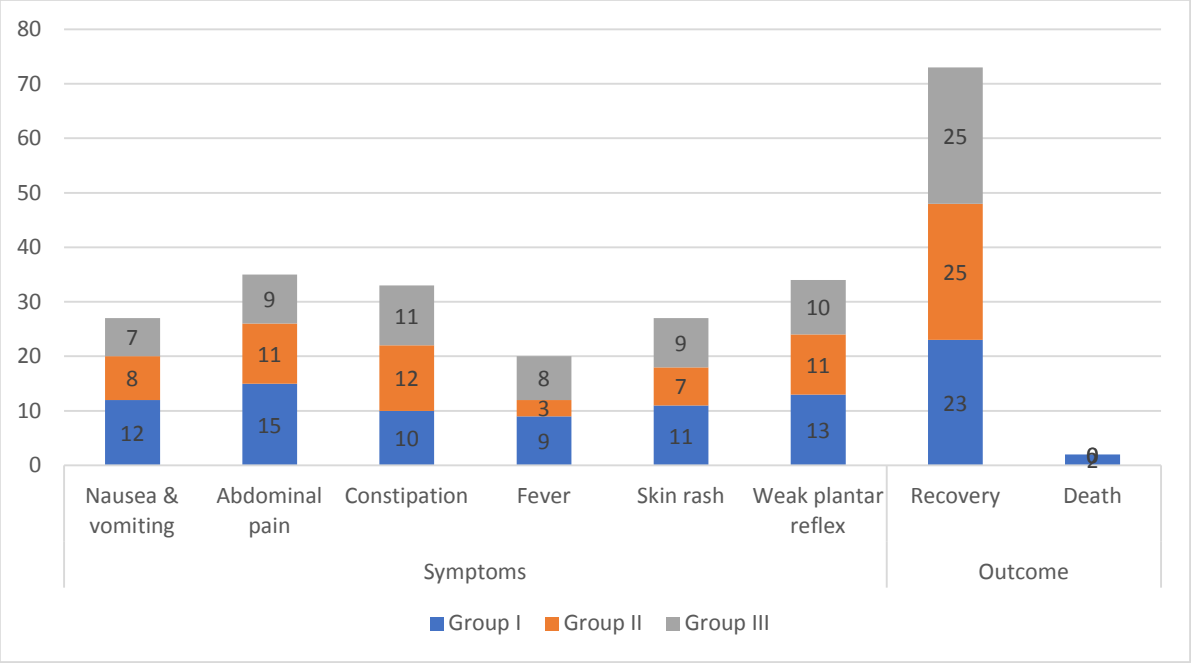

Table III Comparison of parameters

Variables	Group I	Group II	Group III	P value
Length of hospitalization (day)	2.7	3.9	3.5	0.91
Systolic blood pressure (mm Hg)	134.2	130.2	132.6	0.84
Diastolic blood pressure (mm Hg)	84.5	80.2	82.6	0.96
Heart rate (beats/minute)	90.2	88.4	90.8	0.72

Table III shows that mean length of hospitalization was 2.7 days in group I, 3.9 days in group II and 3.5 days in group III. Systolic blood pressure was 134.2 mm Hg in group I, 130.2mm Hg in group II and 132.6mm Hg in group III. Diastolic blood pressure was 84.5 mm Hg in group I, 80.2mm Hg in group II and 82.6mm Hg in group III. Heart rate (beats/minute) was 90.2, 88.4 and 90.8 in in group I, II and III respectively. The difference was non- significant (P> 0.05).

DISCUSSION

Symptoms of lead poisoning take a variety of forms based on the period of exposure and individual characteristics, and depending on the circumstances, non-specific or minor symptoms may appear, or there may even be cases with no noticeable symptoms whatsoever.[9,10] In cases of chronic exposure, symptoms appear to become incrementally more severe as the weeks pass, whereas in cases of acute exposure, strong symptoms can suddenly appear.Symptoms manifest differently in adults than they do in children.[11] In adults, major symptoms include headache, stomach ache, memory loss, renal failure, sexual dysfunction, and reduced sensation in the limbs, and in the early period, non-specific symptoms may manifest such as depression, reduced appetite, intermittent stomach ache, nausea, diarrhea, and constipation.[12]The present study was conducted to assess effects of Succimer and Penicillamine on acute lead poisoning patients.

We found that group I had 14 males and 11 females, group II had 12 males and 13 females and group III had 11 males and 14 females. Dorooshi et al[13]aimed to explore the comparative effects of Succimer and D-Penicillamine on acute lead poisoning patients. In total, 163 patients were evaluated in this research. There was no significant difference between the treatment groups respecting improvement in clinical symptoms. The mean blood lead levels

during hospitalization and two weeks after the treatment did not significantly differ between the three groups; however, there was a significant reduction in all study groups after two weeks of treatment.

We found that symptoms observed were nausea & vomiting in 12, 8 and 7, abdominal pain in 15, 11 and 9, constipation in 10, 12 and 11, fever in 9, 3 and 8, skin rash in 11, 7 and 9 and weak plantar reflex in 13, 11 and 10. Outcome was recovery in 23, 25 and 25 and death in 2 in group I, group II and group III respectively. Shannon et al[14] reported that in one-third of the patients, complications, such as transient leucopenia, thrombocytopenia, rash, enuresis, and abdominal pain were observed.

We observed that mean length of hospitalization was 2.7 days in group I, 3.9 days in group II and 3.5 days in group III. Systolic blood pressure was 134.2 mm Hg in group I, 130.2mm Hg in group II and 132.6mm Hg in group III. Diastolic blood pressure was 84.5 mm Hg in group I, 80.2mm Hg in group II and 82.6mm Hg in group III. Heart rate (beats/minute) was 90.2, 88.4 and 90.8 in in group I, II and III respectively. Lead poisoning has also been found to be the cause of anaemia in a number of cases as lead inhibits porphobilinogen synthase and ferrochelatase, preventing both porphobilinogen formation and the incorporation of iron into protoporphyrin IX, which prevents heme synthesis or causes ineffective heme synthesis and subsequently microcytic anaemia. One of the mechanisms by which lead interferes with cognition is that it acts as calcium analogue which interferes with ion channels.[15] It has been observed that Pb2+ is a potent reversible and selective blocker of voltage-dependent calcium channels at low concentrations.

The limitation the study is small sample size.

CONCLUSION

Authors found that Succimer and Penicillaminefound to be equally effective in acute lead poisoning patients.

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