

Rhabdomyolysis Syndrome in Alcohol, Psychotropic Drugs, and Illicit Substance Poisonings

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ABSTRACT

Background: Rhabdomyolysis is one of the major complications of poisoning caused by alcohol, narcotics, and psychotropic substances acute toxicity, which might lead to acute renal failure and even death. This study aimed to evaluate clinical and laboratory findings of rhabdomyolysis syndrome in poisoning patients who were admitted to poisoning ward of Farshchian Hospital of Hamadan, Iran.

Methods: In this cross-sectional study, patients with acute toxicity by alcohol, narcotics, or psychotropic drugs who were admitted in poisoning ward of Farshchian Hospital of Hamadan were investigated during a 6-month period in 2012. Clinical and laboratory data were collected by a standard questionnaire and analyzed by the SPSS software version 16.

Results: Eighty-two patients aged between 14 to 81 years were investigated. Twenty-two cases developed rhabdomyolysis and narcotics related toxicity was the most common cause. The most common clinical symptom in all patients was muscle pain (51cases, Laboratory studies showed some significant differences between serum creatine kinase (CK), lactate dehydrogenase (LDH), serum creatinine, and aminotransferases (AST,ALT) levels in rhabdomyolysis cases as compared to the others ($p<0.05$).

Conclusion: The results of this study revealed that the incidence of rhabdomyolysis syndrome in acute intoxication with alcohol and narcotics is significant and without proper treatment might cause serious complications such as acute renal failure and even death. Classic clinical signs and symptoms of rhabdomyolysis are usually not present simultaneously, thus strong clinical suspicion and proper laboratory tests have important role in early diagnosis and suitable treatment. Laboratory studies have an important role in the diagnosis of this syndrome.

Keywords: Ethanol, Kidney Injury, Narcotics, Psychotropic Drugs, Rhabdomyolysis.

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INTRODUCTION

Rhabdomyolysis is a clinical syndrome caused by an insult to myocytes and muscle membranes that leads to the destruction of skeletal muscle and release of muscle fiber contents into the bloodstream [1, 2]. The severity of rhabdomyolysis ranges from a subclinical rise of creatine kinase (CK) to a medical emergency comprising interstitial and muscle cell edema, contraction of intravascular volume, and pigment-induced acute renal failure (ARF). Nowadays, rhabdomyolysis is one of the leading causes of acute renal failure [3, 4], but the prognosis of rhabdomyolysis-associated ARF is fairly benign [5]. Rhabdomyolysis has many

etiologies, which can grossly be categorized into physical and nonphysical causes [6]. In the past, the most common cause of acute rhabdomyolysis was crush injuries during wartime, accidents, and natural disasters [7]. More recently, drugs and alcohol have become frequent causative agents of non-traumatic rhabdomyolysis [8-10]. Acute renal failure as the major complication of rhabdomyolysis is quite common, representing 7 to more than 10% of all cases of acute renal failure [11, 12]. The reported incidence of acute renal failure in rhabdomyolysis varies from 13% to 50% [13-15]. Accurate and timely diagnosis and standard treatment of rhabdomyolysis will

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reduce the risk of ARF and its probable mortality [16,17]. The main aim of this study was clinical and laboratory evaluation of rhabdomyolysis syndrome in patients with acute poisoning caused by illicit substances abuse, hospitalized in poisoning ward of Farshchian Hospital in Hamadan, Iran.

MATERIALS & METHODS

In this cross-sectional and descriptive study, all patients who were acutely poisoned by alcohol, narcotics or psychotropic drugs and were admitted to the poisoning ward of our center during a six-month period in 2012 were evaluated. After obtaining written informed, demographic specifications, types of drug or substance, clinical symptoms, laboratory results, and final outcome were recorded for all patients. Rhabdomyolysis was diagnosed based on the following criteria: serum creatine kinase of at least five times higher than the normal range (>975 IU/L) and acute renal failure (serum creatinine greater than 2 mg / dl which did not respond to initial fluid therapy). The collected data was analyzed using SPSS software version 16.

RESULTS

In this study, 82 patients were evaluated over a period of six months. The mean age was 36.2 ± 14.50 with the minimum and maximum ages of 14 and 81 years, respectively. Most patients were in the age range of 16 to 32 years and 75 cases (91.5%) were males and only 7(8.5%) patients were females. The cause of admission in 6(7.3%) patients was acute intoxication with alcohol, in 69(84.1%) cases narcotics overdose, and in the remaining 7(8.5%) patients was psychotropic drug intoxication. Out of 82

cases, 22 (26.8%) had rhabdomyolysis and all of them were males.

Among these 22 involved patients, 2(9.1%) had alcohol poisoning, 18(81.8%) narcotic toxicity, and 2(9.1%) intoxication with psychoactive substances. On the other hand, rhabdomyolysis developed in 2(33.3%) patients with alcohol poisoning, 18(26.1%) patients poisoned with narcotics and 2(28.6%) patients with psychotropic drugs intoxication. (Table 1)

Despite the early treatment of all patients, 5 cases (6.1%) developed ARF, although only 2(2.4%) patients died. One of the deceased was a 32-year-old man who died from severe ARF caused by rhabdomyolysis and the other one was a 40-year-old man who passed away due to unrelated complications. It should be noted that both of them were poisoned by narcotics. Rhabdomyolysis developed in 2 (33.3%) patients with alcohol poisoning, 18(26.1%) with the narcotic poisoning, and 2 (28.6%) with psychotropic drugs intoxication, respectively. (Table 1)

Helpful clinical signs and symptoms in the diagnosis of rhabdomyolysis were as follows: 7 patients (31.8%) had muscle pain and the same number had muscle pain and dark urine. Four of the patients (18.2%) had only dark urine and 4 of them (18.2%) had no clinical sign or symptom. In general, the most common clinical symptom in involved group was muscle pain (14 cases, 63.6%); however, none of them had muscle weakness. The most common clinical symptom in those without rhabdomyolysis was also muscle pain (34 cases, 56.7%) and among them, 17 cases (28.3%) had no clinical sign and symptom. Symptoms were significantly different between the two groups ($P = 0.005$).

Table 1. Comparison of the distribution frequency of types of poisoning leading to rhabdomyolysis in Farshchian Hospital in Hamadan, Iran, 2012.

Total	Psychotrop	Substance narcotic	alcohol		
22	2	18	2	Count	
100.0%	9.1%	81.8%	9.1%	% within Rhabdomyolysis	yes
26.8%	28.6%	26.1%	33.3%	% within substance	
60	5	51	4	Count	
100.0%	8.3%	85.0%	6.7%	% within Rhabdomyolysis	no
73.2%	71.4%	73.9%	66.7%	% within substance	
82	7	69	6	Count	
100.0%	8.5%	84.1%	7.3%	% within Rhabdomyolysis	Total
100.0%	100.0%	100.0%	100.0%	% within substance	

Statistical results based on Mann-Whitney test concerning differences in laboratory values in the two groups are shown in Table 2.

DISCUSSION

One of the most common complications of acute intoxication caused by alcohol, narcotics and psychotropic drugs is rhabdomyolysis which can cause acute renal failure and even death; therefore, to reduce the rate of related morbidities and mortalities,

recognition of its signs and symptoms and timely treatment is of utmost importance.

Rhabdomyolysis was considered to be a common problem in the past, but in recent studies estimates are higher than what was previously accepted [18]. Today this clinical syndrome is considered as one of the major causes of acute renal failure [19-21]; although, fairly few comprehensive studies have been conducted in this field. The results of some of previous studies compared with our findings are shown in Table 3.

Table 2. Comparison of laboratory values of poisoning patients with and without rhabdomyolysis.

P Value	Std. Error Mean	Std. Deviation	Mean	N	Rhabdomyolysis	
<0.0001	1760.79	8258.84	6676.90	22	yes	CK
	27.86	215.82	282.28	60	no	
<0.0001	97.86	459.03	917.18	22	yes	LDH
	42.17	326.67	491.72	60	no	
0.094	3.19	14.99	23.00	22	yes	BUN
	1.53	11.91	18.53	60	no	
<0.0001	0.28	1.35	1.84	22	yes	Cr
	0.04	0.35	1.16	60	no	
0.023	0.14	0.68	4.56	22	yes	K
	0.07	0.56	4.18	60	no	
0.159	0.15	0.71	8.41	22	yes	Ca
	0.09	0.74	8.66	60	no	
<0.0001	135.10	633.71	277.41	22	yes	AST
	24.64	190.89	67.45	60	no	
0.001	61.99	290.77	150.45	22	yes	ALT
	31.37	243.06	88.56	60	no	

Table 3. Comparison of our findings about poisoning patients with rhabdomyolysis with previous studies.

Use of alcohol or illicit drugs	ARF frequency	CK range(U/L)	Age range(year)	Mean age(year)	Male patients	Number of patients	
100%	6.1%	49-34000	14-81	36	91.5%	82	Our findings (2012)
39%	15%	977-98400	14-78	32	72%	165	Mousavi et al. (2006)[22]
34%	46%	2975-250000	14-95	47	68%	475	Melli et al. (2005)[14]
-	6%	-	13-78	-	64%	181	Talaie et al. (2004)[23]
15%	-	-	16-93	60	80%	52	Blanco et al. (2002)[24]
30%	51%	5000-25000	-	-	81%	93	Veenstra et al. (1994)[25]
82%	33%	500-238000	21-85	48	86%	77	Gabow et al. (1982)[10]
65%	-	1000-95000	19-63	36	90%	20	Eneas et al. (1979)[26]
85%	100%	2608-24000	22-63	34	90%	21	Koffler et al. (1976)[27]
20%	100%	370-120000	18-77	40	86%	15	Grossman et al. (1974)[28]

Although in most studies alcohol is one of the main causes of rhabdomyolysis [14-16, 27], there were only 6 patients (7.3%) with acute intoxication by alcohol in the current study, probably due to its ban in our country. Clinical rhabdomyolysis appeared in 33.3% of our alcohol poisoning cases which was considerable. As in the previous studies by Mousavi et al. [22] and Talaie et al. [23], the leading cause of rhabdomyolysis in our study was narcotics. Koffler et al. [27], Gabow et al. [10] and Blanco et al. [24] reported alcohol and illicit drugs as main causes of rhabdomyolysis in these patients. Based on previous studies [10, 14, 16, 23, 24], usually the classic clinical signs and symptoms of rhabdomyolysis do not appear in most patients, rendering early diagnosis difficult. In our study, occurrence of ARF as one of the most dangerous complications of rhabdomyolysis was 6.1%. Although it was similar to Talaie et al. [23] report, in comparison to other studies it was the lowest prevalence. The highest incidence of ARF after rhabdomyolysis have been reported by Grossman et al. [28] and Koffler et al. [27], both of these studies belong to 70s and thereafter, there was a significant reduction in reported cases. This is probably due to earlier diagnosis and proper treatment of rhabdomyolysis. Laboratory studies have an important role in the diagnosis of rhabdomyolysis and as mentioned on the outcome. Significant rise in enzymes such as CK, LDH, AST, ALT and serum creatinine are common. Although mean serum calcium was lower in involved patients and potassium was higher, it was not significant which is consistent with Talaie et al. (24) study. The muscle enzyme CK level is still considered the best marker for the diagnosis of rhabdomyolysis. Maximum amount of this serum marker in our cases was 34,000U/L as compared to 250,000U/L reported by Melli et al. [14].

CONCLUSION

In general, the results of this study showed a high incidence of rhabdomyolysis (26.8%) in patients with acute intoxication by alcohol or illicit drugs. The reported incidence of rhabdomyolysis in these patients

is from 7% in the study of Lai et al. [29] in Norway, to 79% as described by Talaie et al. [23] in Tehran. Classic clinical signs and symptoms of rhabdomyolysis are usually not present simultaneously, thus strong clinical suspicion and proper laboratory tests have important role in early diagnosis and suitable treatment which could prevent ARF in these patients.

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