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A Curious Case of Abnormally Elevated Creatine Kinase Activity in Rhabdomyolysis

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ABSTRACT

Introduction: Creatine kinase (CK) catalyzes the conversion of creatine to phosphocreatine by utilizing Adenosine Triphosphate (ATP). This serves as reservoir of energy in tissues (muscles, heart and brain). So clinically CK is used as a marker of damage of CK-rich tissues.

Case Report: A blood sample of a 36 year old male patient with the history of trauma and complaints of fever associated with generalised edema & passage of dark urine for 1 week duration was received for routine investigations. Since the serum of the patient was clear irrespective of the dark urine. This gave us a suspicion of myolysis, so he was worked up for serum CK, serum Lactate Dehydrogenase (LDH), Aspartate Transaminase (AST) & Alanine Transaminase (ALT). His serum CK activity was alarmingly high. And the patient showed the evidence of hepatic damage with elevated liver markers started to rise from day 1 upon reaching its peak value on day 3 and returned back to normal on day 14. Microscopic examination of urine revealed the absence of Red Blood Corpuscles (RBCs). Benzidine test was strongly positive. He was on intravenous antibiotic therapy, steroids and hemodialysis during the hospital stay and the patient had a speedy recovery.

Conclusion: History of passage of dark cola coloured urine can be due to hemoglobinuria and myoglobinuria. Serum levels of CK always helps in the diagnosis of Rhabdomyolysis. Ammonium sulphate test will be the unique test to differentiate myoglobinuria from hemoglobinuria. A Simple ammonium sulphate test & serum CK values will help in the early diagnosis of Rhabdomyolysis and will improve the prognosis of the patient.

Key words: Creatine kinase (CK); Myoglobinuria; Rhabdomyolysis

ABBREVIATION LIST: adenosine triphosphate (ATP), alanine transaminase (ALT), aspartate transaminase (AST), Creatine kinase (CK), lactate dehydrogenase (LDH), red blood corpuscles (RBCs)

INTRODUCTION

Creatine kinase (CK) catalyzes the conversion of creatine to phosphocreatine by utilizing adenosine triphosphate (ATP). This serves as reservoir of energy in tissues (muscles, heart and brain). So clinically CK is used as a marker of damage to the CK-rich tissues. Normal reference value of total CK is 25 to 200 IU/L.[1] Very high CK values are mostly seen in diseases associated with disruption of CK rich tissues which includes Rhabdomyolysis, Myocardial Infarction, myositis, Malignant hyperthermia, neuroleptic malignant syndrome.[2]

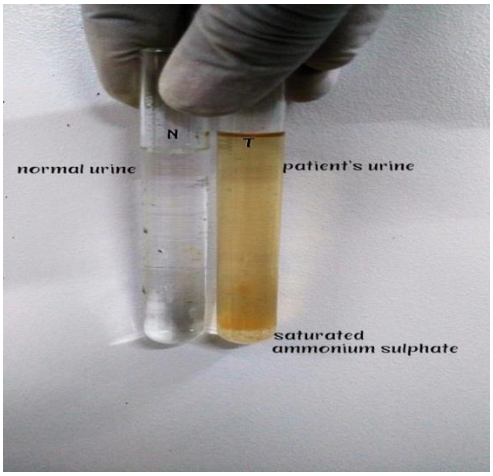
CASE REPORT

In our clinical biochemistry laboratory at Sri Manakula Vinayagar Medical College and Hospital, Puducherry, we received a blood sample of a 36 year old male patient with the history of trauma and complaints of fever associated with generalised edema and passage of dark urine for 1 week duration for routine investigations. Significant findings among routine investigations were hyponatremia with hyperkalemia, elevated aspartate transaminase (AST) & alanine transaminases (ALT). Since the serum of the patient was clear irrespective of the history of passage of dark cola coloured urine for a duration of 1 week. This gave a suspicion of myolysis, because in case of hemolysis & hemoglobinuria the serum will be imparted with red colour. So he was worked up for serum CK and serum LDH. His serum CK activity was abnormally elevated to more than 1 lakh IU/L and serum LDH was elevated to 4950 IU/L. Routine urine analysis of the patient revealed that the urine was dark cola coloured with PH of 6.0, 1-2 epithelial cells & 1-2 pus cells with granular casts. Table 1 shows the laboratory evaluation of biochemical and haematological parameters. Urine microscopic examination revealed the absence of RBCs. Urine Benzidine test was found to be strongly positive. Biochemical investigations of the patient was correlating with haematological findings with haemoglobin 14 g/dl and total leukocyte count was 16600 cells/mm^3. Final confirmation of myoglobinuria was done by ammonium sulphate test [3], (Figure 1) which further revealed the presence of myoglobinuria and this is the unique test to differentiate myoglobinuria from hemoglobinuria. Reason for hyperkalemia & hyponatremia in this case was history of trauma, following which the muscle injury causes damage to the ion channels on sarcolemma, which leads to excessive intracellular influx of sodium & calcium along with efflux of potassium from the damaged muscle. Reasons for elevated AST & ALT in this case were excessive accumulation of calcium inside the damaged muscle cells intensifies skeletal muscle contractility & induces mitochondrial dysfunction which leads to the production of reactive oxygen species and causes the rupture of skeletal muscle along with leakage of intracellular contents (CK, LDH, AST & ALT) into the blood stream. Though we came across few cases of Rhabdomyolysis in our tertiary care centre, this is the first case of Rhabdomyolysis with alarmingly high serum creatine kinase activity of 133050 IU/L.

Table 1: Laboratory evaluation of Biochemical and haematological parameters.

Parameters	Patient's result	Reference value	Units
1.Hemoglobin	16	14 – 16 (for male) 12- 14 (for female)	g/dl
2.RBC count	6	4.5 to 6.0	
3.Total leukocyte count	16600	4000 - 11000	Cells/mm^3
4.Random blood sugar	135	Upto 140	mg/dl
5.Serum Urea	27	15 – 40	mg/dl
6.Serum Creatinine	0.9	0.5 – 1.2	mg/dl
7.Serum Uric acid	5.4	3.5 – 7	mg/dl
8.Serum Sodium	122	135 – 145	mEq/L
9.Serum Potassium	6.1	3.5 – 5.0	mEq/L
10.Serum Total CK	133050	25 – 200	IU/L
11.Serum LDH	4950	230 – 460	IU/L
12.Serum AST	1180	5 – 40	IU/L
13.Serum ALT	290	May-50	IU/L

Figure 1: Ammonium sulphate test



DISCUSSION

Few studies reported the serum CK value of 97,472 U/L in exertional Rhabdomyolysis,[4] and the serum CK value of 71500 U/L in non-hemorrhagic dengue fever with Rhabdomyolysis.[5]

CONCLUSION

History of passage of Dark cola coloured urine need not be always suspected for hemoglobinuria & hematuria. The patient with history of passage of dark coloured urine with clear serum should be suspected for

Rhabdomyolysis. Without any delay patient should be evaluated for serum CK activity. Serum levels of CK will always help in the diagnosis of Rhabdomyolysis. Our case highlights the need for high index of clinical suspicion of Rhabdomyolysis in patient with history of trauma associated with passage of dark cola coloured urine. Early diagnosis can decrease the worsening complication like acute renal failure and will improve the prognosis of the patient in case of Rhabdomyolysis.

REFERENCES

1. Burtis C, Ashwood E, Bruns D. Tietz fundamentals of clinical chemistry and molecular diagnostics. 5th ed. St.Louis: Elsevier; 2013.
2. Vasudevan D, Sreekumari S, Vaidyanathan K. Textbook of biochemistry for medical students. 8th ed. Kochi: Jaypee Brothers Medical Pub.; 2016.
3. Varley H. Practical Clinical Biochemistry. 4th ed. Delhi: CBS Publishers & Distributors; 2005.
4. Berry A, Lenchus J, Avalos D, Caplan A, Berry B, Monzel M. Exertional Rhabdomyolysis: A Case of Markedly elevated Creatine Kinase Without Acute Kidney Injury. J Med Cases. 2014;5(9):483-485.
5. Jha R, Gude D, Chennamsetty S. Non-hemorrhagic dengue fever with rhabdomyolysis. Saudi J Kidney Dis Transpl . 2013;24(6):1207-9.