



INVESTIGATION OF CREATINE PHOSPHOKINASE (CPK) LEVEL IN BLOOD SERUM OF MALARIAL PATIENTS

S. Baloch, G. S. Gachal and *S. A. Memon

Department of Zoology, University of Sindh, Jamshoro.

Received 01st April 2010 and Revised 22nd September 2010)

Abstract

Malaria is the most common infectious disease causes millions of deaths worldwide and it is a major public health problem in Pakistan. In the present study blood serum levels of creatine phosphokinase (CPK) was determined in 12 malarial patients and 12 healthy control subjects by using kit method on Microlab 300. The results obtained for malarial patients were compared with those obtained for the healthy subjects. Enzyme CPK is most abundant in heart, skeletal and brain muscles and in small quantities in tissues such as smooth muscles. It has been observed that in malarial patients the mean levels of CPK significantly decreases as compared to that determined in healthy subjects. The mean value of CPK determined to be 77 with the standard deviation of 38.8072 for 12 malarial patients as compared to 12 normal subjects with the mean value of 86.34 and standard deviation of 33.82396.

Keywords: - Malaria, Creatine Phosphokinase (CPK), Serum, and Microlab300.

1. Introduction

Malaria is a vector-borne infectious disease caused by a eukaryotic protist of the genus "Plasmodium". It is widely spread over tropical and subtropical regions, including parts of the America, Asia, and Africa. There are approximately 350–500 million cases of malaria, killing one to three million people each year, the majority of whom are young children in Sub-Saharan Africa. Ninety percent of malaria-related deaths occur in Sub-Saharan Africa. Malaria is commonly associated with poverty (<http://www.news-medical.net/health/What-is-Malaria.aspx>). Creatine phosphokinase (CPK) is an enzyme present in muscle, brain, and other tissues of vertebrates where, it catalysis the transformation of creatine to phosphocreatine consuming adenosine triphosphate (ATP) to adenosine diphosphate (ADP). Creatine phosphate serves as an energy reservoir for the rapid buffering and production of ATP, being the major source of energy in biochemical reactions consumed by the tissues of skeletal muscle, brain and smooth muscle. CK is rapidly inactivated by oxidation of the sulfhydryl groups in the active site of the enzyme. The enzyme can be reactivated by the addition of N-acetylcysteine (NAC), standard method for the determination for CK using the reverse reaction. (wikipedia.org/wiki/Creatine_kinase). The muscle fibre alterations, including disorganization of the contractile machinery, have been reported by *Carmona et al.*, (1996) in skeletal muscles infected with malaria. Furthermore, significant changes in serum levels of creatine kinase and myoglobin have

been reported in humans infected with falciparum malaria (Miller *et al.*, 1989b; Davis *et al.*, 1999, 2000).

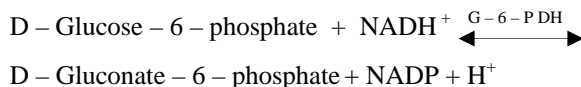
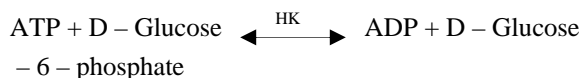
2. Experimental Material and method

Twelve venous blood samples (10ml) each from malarial patients and twelve healthy subjects were collected into sample tubes without any addition of anticoagulant. The blood samples were centrifuged at 1500 r.p.m for 20 min, the serum was separated and immediately used for the determination of the CPK by kit method on MicroLab300 a software-controlled system used for clinical chemistry. (Microlab 300 User Manual).

Wikipedia.org/wiki/Creatine_kinase.

Determination of CPK – NAc.

Reaction:



The rate of increase in NADPH is determined photometrically, and is directly proportional to the CK activity in the sample material.

Method

Only one test tube is required, which is filled with the following, and the sample is run.

R 1 (Reagent) = 400 µL + R 2(Reagent) = 100 µL + Serum = 20 µL.

3. Results and Discussions

Table 1 shows the blood serum level of Creatine Phosphokinase (CPK) activity in malarial patients. The results shows decrease level in malarial patients and **Table 2** shows blood serum level of Creatine Phosphokinase (CPK) in healthy control. **Fig 1** shows CPK mean value decrease status in serum by the attack of malaria.

Statistical data of CPK activity

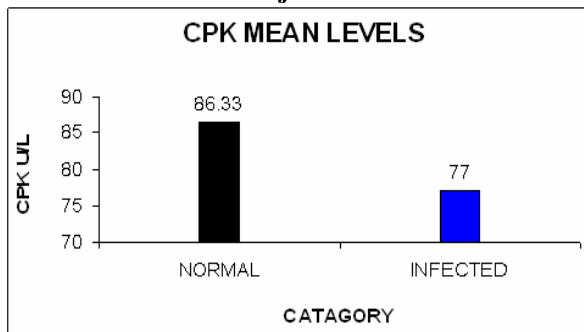
Table 1. Shows blood serum level of Creatine Phosphokinase (CPK) activity in malarial patients. All values are expressed as Mean ± S.D.

Malarial Patients	AGE	CPK (U/L)
Mean	34.67	77
Standard Deviation	16.84	38.8072
Confidence Level (95.0%)	10.69	24.65694

Table 2. Shows blood serum level of Creatine Phosphokinase (CPK) Activity in healthy control. All values are expressed as Mean ± S.D.

Healthy Control	AGE	CPK (U/L)
Mean	45.91	86.34
Standard Deviation	7.089	33.82396
Confidence Level (95.0%)	4.504	21.49073

Fig 1. Shows decrease level of serum CPK activity in malarial patients as compared to normal subjects.



It is reported that the skeletal muscle damage is frequent in malaria. , However, in the present study the Creatine Phosphokinase (CPK) serum levels significantly decrease in malarial patients as compared to normal subjects. It is well established fact that patients suffering from malaria experience skeletal muscle problems such as contracture, aches, fatigue and weakness. (Marco *et al.*, 2005)

5. Conclusion

In this study, we have shown the use of a Microlab300 method, for the determination of blood serum activity Creatine Phosphokinase (CPK) in malarial patients, which shows decrease value as compared to healthy subjects. There is no clear role of creatine Kinase in malaria but due to the decrease in the ATP content of the body its level is also decreased in malaria. Decrease of Creatine Phosphokinase (CPK) enzyme could lead to low energy or immunity in body because its directly rules skeletal muscles, brain, and photoreceptors, etc, so its decrease could cause a disaster in human body.

References

Carmona M., H. J, Finol, A. Marquez and O. Noya (1996) Skeletal muscle ultrastructural pathology in *Serinus canarius* infected with *Plasmodium cathemerium*. *J Submicrosc Cytol Pathol* (28): 87–91.

Davis T. M., W. Supanaranond S, Pukrittayakamee P, Holloway P. Chubb and N. J. White (2000) Progression of skeletal muscle damage during treatment of severe *falciparum malaria*. *Acta Trop* (76): 271–276.

Marco A. P., T. Brotto, M. Marrelli, S. L. Brotto, M. Jacobs-Lorena and M. Thomas (2005) Functional and biochemical modifications in skeletal muscles from malarial mice. *Experimental Physiology*, (90): 417-425.

Microlab 300 User Manual.

Sachs J., and P. Malaney (2002) The economic and social burden of malaria. *Nature*, (415): 680-685.

Wikipedia.org/wiki/Creatine_kinase.

www.news-medical.net/health/What-is-Malaria.aspx.