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Original Research Article

Serum acid phosphatase level - is it a marker for diagnosis of malaria

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ABSTRACT

Background: Malaria is endemic throughout most of the tropics. Technically, detection of malaria parasite may be missed due to low parasite density at sampling time and poor blood film preparation. The study was aimed to evaluate the serum acid phosphatase levels as a possible diagnostic marker for malarial infections.
Methods: This study was conducted on a total of 100 subjects (40 malaria cases, 30 non-malarial cases and 30 sex and age matched healthy controls attending the department of medicine, PESIMSR, Kuppam. Venous blood sample was collected and serum acid phosphatase (ACP) level estimation was be done by enzymatic method using commercial kit (Raichem diagnostics kit).
Results: Serum ACP level was highly significantly elevated in malarial group (Mean±SD) (3.14±1.22) when compared with control (1.33±0.72) and non-malarial (1.81±0.30) groups (P value <0.001.).
Conclusions: In this study, there was a significant increase in the serum ACP levels in malarial patients as compared to other groups. This suggests that serum ACP levels can be used as a marker for malaria.

Keywords: Acid phosphatase (ACP), Malaria

INTRODUCTION

Malaria is a life-threatening mosquito borne blood disease caused by a plasmodium parasite. It continues to be endemic throughout most of the tropics. While majority of complicated cases are attributable to P. falciparum (90 percent), P. vivax can also cause severe disease.[1] Malaria is transmitted via the bite of an infected female Anopheline mosquito.[2,3] India alone contributes about 70% of the 2.5 million reported cases in South East Asia. More than two third Indian population lives in malarial zones. Malaria is a curable disease if diagnosed and treated promptly and correctly. Early diagnosis is critical for patient recovery and prevention of complications. The only reliable method currently available for diagnosis of malaria is by identification of the malarial parasite in the peripheral blood smear in people with symptoms and signs associated with the disease. Technically, detection of malaria parasite may be missed due to low parasite density at sampling time and poor blood film preparation. Search for additional markers for diagnosis of malaria is an ongoing effort. The present study was conducted to evaluate serum Acid phosphatase (ACP) levels as a possible diagnostic marker for malarial infections.

METHODS

This was a cross sectional study conducted on a total of 100 subjects, at the department of medicine, P.E.S

institute of medical sciences and research, Kuppam, Andhra Pradesh, India. Out of 100 cases, 40 were malaria patients (30 *P. falciparum* cases and 10 mixed malaria cases), 30 were non-malarial patients and 30 sex and age matched healthy controls. Informed consent was taken from all the three groups and the study was approved by the institutional ethical and research committee.

Inclusion criteria

- All malaria positive (smear/strip positive) cases
- Patients with non-malarial febrile illness.

Exclusion criteria

- Patients with non-malarial hemorrhagic febrile illness (E.g.: Dengue)
- Patients with complicated malaria.

Under aseptic conditions blood sample (5ml) were drawn into plain tubes from antecubital veins of all three groups. The collected blood was allowed to clot for 30 minutes and then centrifuged at 2000 rpm for 15 minutes for clear separation of serum. Only clear, un-hemolyzed serum sample was used for estimation of ACP level by kit (Raichem diagnostics kit) using auto analyzer Chemwell.

RESULTS

Results were analyzed using SPSS 20. All values were expressed as mean±sd. Comparisons between the groups were done by one-way analysis of variance (ANOVA) (Table 1) and pair wise comparison was done by multiple comparison post- hoc tests (Table 2). A P value <0.05 was considered as significant.

Table 1: Comparison of serum ACP in three groups by one-way ANOVA.

Study variables	Control (mean±sd)	Non-malarial (mean±sd)	Malaria (mean±sd)	P value
ACP (U/L)	1.33±0.72	1.81±0.30	3.14±1.22	<0.001***

*** significant (P value <0.001).

Table 2: Pair wise comparison of serum ACP in three groups by multiple comparison post HOC test.

Study variable	Control versus non-malarial	Control versus malaria	Non-malarial versus malaria
ACP (U/L)	0.114	<0.001***	<0.001***

*** significant (P value <0.001).

The mean serum ACP level was significantly elevated in malaria group (3.14±1.22) when compared with control group (1.33±0.72, p value<0.001) and non-malarial group (1.81±0.30, p value<0.001). There was no significant increase in mean ACP level in non-malarial group (1.81±0.30) when compared with control group (1.33±0.72) and the p value was 0.114.

DISCUSSION

In the present study, the mean ACP level was significantly elevated in malaria group when compared with control group and non-malarial group. Similar findings were noted by D'Souza B et al, Garba IH et al, Daniel E et al, Pratinidhi SA et al.[4-7] It has been reported that the red blood cells contain an excess quantity of ACP. The cell membrane plays a central role in the growth and propagation of the malarial parasite in the blood. On one hand, it carries the parasite specific receptor sites on its surface, while on the other, it allows the parasite to derive the nutrients essential for the intracellular parasite development and growth from the host blood.[8] Invasion of the human erythrocytes by the malarial parasite is accompanied by a variety of biological responses. These include the reactive oxygen species generated in the major host-parasite interactions. Increase in ROS and decrease in antioxidants has been reported in malaria patients.[9-11] The alterations in the major antioxidants of the erythrocytes and the peroxide mediated lysis of the erythrocytes may result in release of enzymes like ACP.[5]

CONCLUSION

We conclude that serum ACP levels were significantly elevated in malaria patients. Therefore, serum ACP can serve as a marker for hemolysis indicating the active stage of the disease, which may be used as an additional investigation in the diagnosis of malaria. Limitations of present study: small sample size.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Guerra CA, Gikandi PW, Tatem AJ, et al. The limits and intensity of *Plasmodium falciparum*

transmission: implications for malaria control and elimination worldwide. PLoS Med. 2008;5:e38.
2. Anderson G, Morton C, Green I. Community Health. 3rd Edn, Churchill Livingstone, USA. 1981:45-68.
3. Cheesbrough, M. District Laboratory Practice in Tropical Countries. Cambridge University Press,Cambridge.1998.
4. D'Souza B, Parthasarathy R, Sreekantha, D'Souza V. Acid phosphatase as a marker in malaria. Ind J Clin Biochem. 2011;26(4):396-9.
5. Garba IH, Gatsing D, Ubom G. Elevated total and isoenzyme forms of acid phosphatase in falciparum malaria. Comptes Rendus Biologies. 2006;329(2):75-8.
6. Goldberg DE, Slater AF, Cerami A, Henderson GB. Hemoglobin degradation in the malaria parasite Plasmodium falciparum: an ordered process in a unique organelle. Proceedings National Academy Sci. 1990;87(8):2931-5.
7. Pratinidhi SA, Agarwal SV, Sagare AA, Gawade SH, Haribhakta SV, Hegde MV, et al. Study of serum acid phosphatase levels in children with malaria. IJHSR. 2014;4(2):73-7.
8. Anderson HR, Nielsen JB, Nielsen F, Philippe G. Antioxidative enzyme activities in human erythrocytes. Clin Chem. 1997;43(4):562-8.
9. Bhabhani SD, Nilini KN. Evidence for erythrocyte lipid peroxidation in acute falciparum malaria. Trans R Soc Trop Med Hyg. 1999;93:58-62.
10. Clark IA, Hunt NH. Evidence for reactive oxygen intermediates causing the haemolysis and parasite death in malaria. Infect Immun. 1983;39:1-6.
11. D'Souza B, D'Souza V, Swagatha H, Vijayalaxmi K, Namratha AS. Erythrocyte superoxide dismutase and catalase and their correlation with malondialdehyde in falciparum and vivax malaria. Biomed Res. 2009;20(1):25-7.

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