Abstract: The heart is remarkably resilient even in the face of heavy parasite sequestration and other vital organ dysfunction, and deaths from cardiac arrhythmias in severe malaria are rare. Malaria may prove fatal for patients with pre-existing cardiac failure due to valvular stenosis or myocardial disease. High grade fever, parasitaemia, and fluid overload can all contribute to the problem. Cardiac arrhythmias are very rarely observed in severe falciparum malaria. An attempt has been made to evaluate the risk factors for cardiovascular diseases in malaria infected patients. In the present study the levels of total cholesterol, low density lipoproteins, triglycerides were high and the levels of high density lipoproteins were low in malaria infected patients compared to controls. The markers of free radical induced injury i.e. malondialdehyde were high. The study therefore suggests the importance of assessing these markers of oxidative stress along with the other routine investigations in malaria infected patients for initiating therapy in addition to primary and secondary preventive measures to mitigate the devastating consequences hyperlipidemia in malaria infected patients leading to cardiovascular diseases.

Key words: malaria total cholesterol low density lipoproteins high density lipoproteins

INTRODUCTION

Malaria is a major public health problem in tropical areas, and it is estimated that malaria is responsible for 1 to 3 million deaths and 300–500 million infections annually. The vast majority of morbidity and mortality from malaria is caused by infection with *P. falciparum*, although *P. vivax*, *P. ovale*, and *P. malariae* also are responsible for human infections (1). Severe malaria is a medical emergency requiring immediate hospitalization with prompt initiation of appropriate parenteral therapy to rapidly reduce and eliminate parasitaemia. Myocardial function is generally well preserved in severe falciparum malaria. The cardiac index may be elevated with low peripheral vascular resistance and low-to-normal ventricular filling pressures.
were 110 patients diagnosed for different types of malarial infection. All the subjects, after obtaining their consent were examined clinically and information pertaining to age, sex, habits and health status was recorded in special case proforma. Blood samples were collected from both controls and patients for a series of laboratory investigations using standard protocols for estimation of lipid profiles, levels of MDA. The study has the approval of the institutional ethical committee, for biomedical research.

Patients diagnosed for malaria within age group of 15–55 years were included, treatment for malaria was continued during the study period. Diabetic and hypertensive patients, patients with past history of liver disease, myocardial infarction and renal diseases were excluded.

**Estimation of lipid profiles:** EDTA plasma was obtained from all subjects. Plasma cholesterol and triglyceride concentration were determined by enzymatic methods. HDL cholesterol concentration was determined from the clear supernatant obtained after precipitation of chylomicrons, VLDL and LDL adding phosphotungstic acid and magnesium ions.

**Estimation of Lipid peroxidation:** Estimation of plasma malondialdehyde (MDA) levels was carried out by the method of Gavino et al. (8). MDA is formed as an end product of lipid peroxidation, which reacts with TEA (Thiobarbuturic acid) to form a faint pink colored product. 0.5 ml of plasma was made up to 1 ml with saline and an equal volume of trichloroacetic acid (TCA) was added and

**MATERIALS AND METHODS**

The subjects of the present study were 110 patients diagnosed for different types of malarial infection. All the subjects, after obtaining their consent were examined clinically and information pertaining to age, sex, habits and health status was recorded in special case proforma. Blood samples were collected from both controls and patients for a series of laboratory investigations using standard protocols for estimation of lipid profiles, levels of MDA. The study has the approval of the institutional ethical committee, for biomedical research.

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DISCUSSION

It was an established fact that acute infection and inflammation produce a moderate change in plasma lipoprotein pattern in man, with a typical rise in serum triglyceride concentration and decline in HDL cholesterol. Such changes are basically due to increased VLDL production, increased mobilization of free fatty acids from adipose tissue in response to stress. Adipose tissue lipolysis, increases de novo hepatic fatty acid synthesis and suppression of fatty acid oxidation in severe infection are common. In addition to this there is some impairment in lipoprotein lipase system also. The present study also made an attempt to estimate the levels of malondialdehyde, a marker of lipid peroxidation and found that the levels of MDA were higher in diabetics compared to respective groups.

The mechanism involved in lipid changes related to malaria remains still uncertain. They may be partly host related, i.e. related to an acute phase reaction. (Rosenson 1993) A selective uptake of HDL particles by P. falciparum has been speculated (Maurois et al 1978).
The present study extends the observation of earlier studies and clearly demonstrates that acute malarial infection produces a unique perturbation of plasma lipoprotein metabolism and reflects a multiple alterations in lipid and lipoprotein profiles in plasma. This further justifies the hypothesis looking for plasma lipid profiles in the diagnosis of malarial infection. In malaria, the lipoproteins are oxidatively modified, and the degree of oxidation is related with severity. Oxidized LDL from malarial patients increases the endothelial expression of adhesion molecules. These suggest the role of oxidized lipoproteins, especially LDL, on the pathogenesis of disease.

The most important risk factors contributing to the development of cardiovascular disorder include lipid disorders. Elevated levels of cholesterol, LDL and triglycerides as the risk factors in malaria have been demonstrated in several studies (9–11). In the present study the estimated levels of cholesterol, LDL, triglycerides were found to be significantly high compared to controls and the levels of HDL were lower than the controls.

This study highlights peculiarities in clinical presentation and outcome, as well as in some pathophysiological parameters of malaria patients. This will be helpful to a better understanding of the immunologic interactions incidental to malaria. Furthermore it could be very important in the early recognition and proper management of the occurrence of this deadly form of the disease.

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