

A Correlation of Cerebral Malaria with Changes in Renal System: A Hospital Based Study.

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ABSTRACT

Background: Most severe neurological complication of infection with *Plasmodium falciparum* is Cerebral malaria (CM). In adults, cerebral malaria is part of a multi-organ disease. Patients develop fever, headache, body ache and progressively, delirium and coma. Hence; we planned the present study to assess the renal manifestation in patients with CM. **Materials & methods:** Present study was planned to assess renal manifestations in patients with CM. A total of 25 patients were included in the present study which were diagnosed with suffering from CM. Fasting blood samples and urine samples were collected from all the patients. Complete hematological and urine picture was obtained for evaluation of renal manifestations in CM patients. All the results were analyzed by SPSS software. **Results:** Renal manifestations were found to be present in 40 percent of the patients suffering from CM. Proteinuria was the most common renal manifestation encountered in the present study, which was seen in 28 percent of the total patient's population. **Conclusion:** Renal manifestations are seen in a significant population of patients affected with CM.

Keywords: Cerebral Malaria, Manifestation, Renal.

INTRODUCTION

Malaria is one of the most common parasitic diseases causing morbidity and mortality in the tropics. The manifestations of malaria are protean.^[1] The possible pathogenetic mechanisms are hyperparasitaemia with sequestration in internal organs, intravascular haemolysis, DIC, and immune mediated; role of cytokines mediated injury has also been documented. Most severe neurological complication of infection with *Plasmodium falciparum* is Cerebral malaria (CM). The clinical features of cerebral malaria have been reviewed extensively.^[2,3] The clinical hallmark of cerebral malaria is impaired consciousness, with coma the most severe manifestation. This is thought to be caused by parasitized red blood cells (pRBCs) sequestered in cerebral micro-circulation, but other authors attribute the impaired consciousness to metabolic factors and inflammatory mediators. In adults, cerebral malaria is part of a multi-organ disease.^[4,5] Patients develop fever, headache, body ache and progressively, delirium and coma.^{6,7} Hence; we planned the present study to assess the renal manifestation in patients with CM.

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MATERIALS AND METHODS

Present study was planned in the department of general medicine of the Haridev Joshi Hospital, Dungarpur, Rajasthan and it included assessment of renal manifestations in patients with CM. ethical approval was obtained from the hospital's ethical committee and written consent was obtained after explaining in detail the entire research protocol.

Exclusion criteria for the present study included

Patients with less than 18 years of age,
Patients with more than 70 years of age,
Patients with history of any other systemic illness,
Patients with malignancy of any tissue,
Patients with history of intake of drugs which affect the renal function,
Patients with any known drug allergy,
Patients with pre-existing renal pathology

After meeting the exclusion criteria, a total of 25 patients were included in the present study which were diagnosed with suffering from CM. Complete demographic details of all the patients were recorded. Fasting blood samples and urine samples were collected from all the patients. Transport media was used for sending the samples to the laboratory for evaluation. Complete hematological and urine picture was obtained for evaluation of renal manifestations in CM patients.

Statistical analysis

All the results were analyzed by SPSS software. Univariate regression curve was used for assessment of level of significance.

RESULTS

A total of 25 patients were included in the present study, out of which, 15 were males and 10 were females. Mean age of the patients was 47.1 years. Renal manifestations were found to be present in 40 percent of the patients suffering from CM. Proteinuria was the most common renal manifestation encountered in the present study, which was seen in 28 percent of the total patient's population. Hyponatremia and hyperkalemia were found to be present in 1 case each of the total population.

Table 1: Pattern and prevalence of renal manifestations in CM patients

S No.	Renal manifestation	No. of patients	Percentage
1	Chronic Malarial Nephropathy	1	4
2	Acute Malarial Nephropathy	0	0
3	Proteinuria	7	28
4	Hyponatremia	1	4
5	Hyperkalemia	1	4
Total		10	40

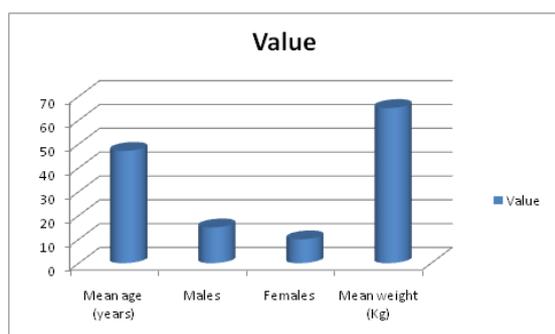


Figure 1: Demographic details of the patients

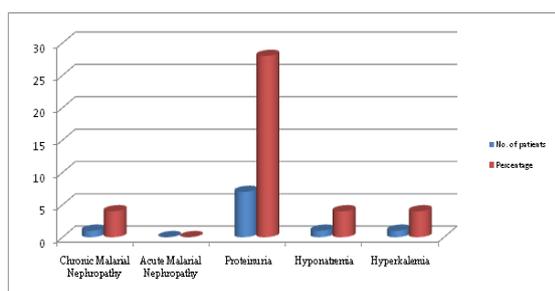


Figure 2: Pattern and prevalence of renal manifestations in CM patients

DISCUSSION

Malaria has emerged as one of the top 10 killer diseases in the world. It is the major cause of mortality in tropical and subtropical regions. Nearly half of world population is vulnerable to malaria. About 500 million people suffer from malaria leading to death in 2 to 3.0 million cases.^[6,7] Renal manifestations of the CM cases are quiet common

these days. Hence; we planned the present study to assess the renal manifestation in patients with CM.

In the present study, we observed that renal manifestations were prevalent in 40 percent of the CM population. Padhi RK et al determined the incidence of renal complication in malaria cases reported in children of Odisha. 108 cases of malaria who were admitted to Department of Paediatrics during the period from July 2006 to November 2008 were included in the prospective study. Extensive investigations were carried out to check for renal involvement in these cases. 50.9% of cases showed some form of renal involvement, most of which were recorded in age group of 5–10 years. Overall, males had a higher incidence than females. 62.7% of total cases infected with *P. falciparum* showed renal involvement though mixed infections with both *P. falciparum* and *P. vivax* had 100% renal involvement.^[8] Mishra SK et al analysed 110 adult patients with cerebral malaria, 38 of whom had serum creatinine above 3 mg%, to study the effect of acute renal failure (ARF) on survival. Patients with cerebral malaria had an increased risk of death (39.5% versus 13.9%) when also suffering from ARF. For each one log unit increase of creatinine at admission, odds of death increased by a factor of 10.8.^[9] Proteinuria, usually less than 1 g/24 h, occurs in 60% of cases. It usually resolves completely with recovery from MARF. However, persistent proteinuria may be noticed in those who have significant interstitial or glomerular involvement (vide infra). There are no specific findings in the urinary sediment.^[10]

Hyponatremia is a typical biochemical finding in MARF, being reported in up to 55% of cases. Although internal dilution is the usual mechanism (vide supra), true sodium wastage that occurs before the onset of oliguria has been reported (1). The observed elevation of serum antidiuretic hormone does not seem to play a significant role in the pathogenesis of hyponatremia in MARF.^[11] Hyperkalemia is striking and often fatal. It is attributed to hemolysis, rhabdomyolysis, and acidosis, particularly in the presence of impaired renal function. Lactic acidosis is common, reflecting the degree of tissue hypoxia. Serum calcium is often reduced out of proportion of the phosphate retention, which may be due to hypoparathyroidism of unknown cause.^[11] Vannaphan S et al evaluated factors associated with acute renal failure in severe malaria by comparing patients with severe malaria with and without ARF admitted to the Hospital for Tropical Diseases, Bangkok, Thailand. Nine hundred fifteen severe malaria patients were included in the study, of whom 195 had ARF and 720 did not have ARF. They found jaundice, anemia, hypoalbuminemia, hyponatremia, hyperkalemia, acidosis, leukocytosis, elevated transaminases (SGOT and SGPT) and cerebral malaria, were significantly associated with ARF among patients

with severe malaria ($p < 0.05$). Patients who have ARF and any of these clinical or laboratory manifestations of severe malaria should be monitored and managed properly, since early detection and treatment may reduce morbidity and mortality.^[13] Goyal JP et al compared the clinical Profile between *P. vivax* and *P. falciparum* Malaria in Children. Inclusion criteria were patients in whom either *P. falciparum* or *P. vivax* was positive on rapid malaria antigen test and peripheral blood smear. Patients showing mixed infections were excluded from study. A total of 79 subjects (mean age 5.4 ± 3.6 years) were included in the study. It consisted of 47 *P. vivax* and 32 *P. falciparum* cases. The *P. vivax* cases consisted of 33 (70.2%) males and 11 (19.8%) females while *P. falciparum* cases consisted of 14 (43.8%) males and 18 (56.2%) females. One patient of each *P. vivax* and *P. falciparum* expired. There was no statistical significant difference found between complications such as anemia, thrombocytopenia, liver and renal dysfunction, ARDS, and cerebral malaria between *P. vivax* and *P. falciparum*. They concluded that *P. vivax* monoinfection tends to have as similar course and complications as compared to malaria due to *P. falciparum* monoinfection.^[14]

CONCLUSION

Within the limitations of the study we conclude that electrolyte level in our study group was within normal ranges except for bicarbonate. Further studies are required in this context for more clarity.

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