AIMS & OBJECTIVES
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Cerebral involvement is an important and serious complication of acute malaria. Beside adults, the usual victims are the children living in endemic areas. The majority of such victims belongs to the developing countries like India, where there is often a high mortality rate due to cerebral malaria.

The phenomenon of cerebral malaria has been extensively studied. However, the pathogenesis is somewhat poorly understood as none of the earlier hypothesis is sufficiently comprehensive to fully explain the initiating circumstances and the sequence of events. Any endeavor to unravel this complicated conundrum, as also to suggest some possible methods for saving human lives from this condition, would, therefore, be a major step in understanding this important riddle within the realm of malaria research.

In view of the above considerations, the present investigation was therefore designed to study some of the selected aspects of cerebral malaria as under:

1. (a) The extent of brain involvement in an animal model with induced cerebral malaria.
   (b) The correlation of morphological and ultrastructural changes in brain with some biochemical studies - Investigations in Rodent Malaria System.
2. The immunization of rhesus monkeys against malaria for checking the degree of immune protection, if any.

For investigating the aforementioned aspects, some of the essential steps and the details of the study plan were as follows:

1.(a) 1) Maintenance of a continuous supply of parasites through an in vivo cell line of Plasmodium knowlesi from infected rhesus monkeys.

2) Studies on infected brains from laboratory induced cerebral malaria following their dissection soon after the death of animals.

3) Study of the tissue damage in light microscopic studies of sections from various regions of the brain.

4) Studies on ultrastructural changes in the infected brain through electron microscopy.

1.(b) Parallel studies in rodent malaria system were also carried out. Firstly, to compare the pattern of brain damage from that of simian malaria, and secondly, to further elaborate and confirm the authenticity of findings on the obliteration of some of the biochemical parameters, as far as damage to the brain tissue was concerned.
In order to make some essential and possibly similar comparisons in rodent malaria system, white albino mice infected with *P. berghei* were sacrificed on reaching peak parasitaemia. Their brain were excised and processed, mainly for conducting the following biochemical studies:

i) Alterations in the concentration of total lipids, phospholipids, cholesterol and ganglioside contents.

ii) Perturbations in the rate of lipid peroxidation, lipid peroxide contents, the level of hydroperoxides and the activity of the enzyme superoxide dismutase.

2. The role of immunity, if any, in protection, or, at least, in minimizing the course of pathogenic events in cerebral malaria, was further studied in immunized/vaccinated monkeys.

a) The *P. knowlesi* antigen used for animal immunization was first isolated and subjected to PAGE for checking any possible host contamination.

b) The checking of antigenicity of the isolated parasite material was carried out by means of IHA tests against *P. knowlesi* specific antiserum.

c) Rhesus monkeys were immunized against *P. knowlesi* using antigen alone and in combination with MDP (Muramyl dipeptide) adjuvant.
i) Humoral immune responses were studied in immune sera samples by using IHA and ELISA techniques.

ii) The cell-mediated immune responses were assayed by employing delayed type hypersensitivity reactions, leukocyte migration inhibition test and macrophage migration inhibition tests.

iii) Protective role of the elicited immune responses were assessed by challenging the immunized animals with viable parasites. The protection of the immunized animal was further studied by assaying some of the following parameters:

a) Length of prepatent period.

b) Percentage of animals which become patent following challenge.

c) Magnitude of peak parasitaemia.

d) Survival rate during post-challenge period.

e) Course of infection and the accompanying pathogenicity was studied by carrying out histological examination of tissue sections from brain, liver, spleen and kidney in the test and control animals.