

Nonspecific Immunological Effect of Haelan 851 in Antimalaria Treatment

ABSTRACT: This paper describes the observed effects of nutritional supplementation with Haelan 851, Platinum Formula, oral nutritional beverage, on the nonspecific immunological effects on rats infected with malaria and later treated with conventional antimalaria treatments.

The materials used in this study involve the following:

1. Malaria parasite: ANKA strain of Plasmodium berghei, supplied by the Institute of Parasitological Research, China Academy of Preventative Medicine. The species was preserved through blood infection in mice.

2. Medicines and Nutritional Products:

- a) Haelan 851, Platinum Formula, liquid oral nutritional beverage
- b) Tragacanth powder
- c) Kang Yao Tong tablets, (K.Y.T. hereinafter)

Note: K.Y.T. is a new antimalaria drug furnished by the Institute of Parasitological Research, China Academy of Preventative Medicine.

- d) Chloroquine and K.Y.T. suspensions made with tragacanth
- e) Indian ink, diluted with distilled water

3. Animals: 130 healthy male mice weighing between 18-22 grams were divided randomly into two large groups. These two groups were subdivided into six and seven subgroups containing 10 mice each. The mice were fed in separate cages following the standard routine feeding practice.

4. Preparation of chicken erythrocyte suspension: Blood was drawn from the wing vein of a healthy Leghorn chicken with a sterilized syringe and mixed into fivefold Asever solution and stored under refrigeration at a temperature of 4 degrees centigrade. Before use, it was washed centrifugally with sterilized normal saline three times and prepared into a 5% normal saline chicken erythrocyte suspension.

II. Method and result:

The 130 male mice, with the exception of those in the normal groups, were inoculated peritoneally with 2×10^7 malaria parasite infected erythrocytes and were given respectively the following medicines and/or supplemental nutrition.

- (1) Haelan 851, Platinum Formula, liquid oral nutritional beverage at 10 ml/kg/d x 5
- (2) Chloroquine at 100 mg/kg/d x 5 by means of perfusion of stomach

On the second day after the above procedure was completed, blood was taken from the tails of the mice for smearing, staining, microscopic examination and counting the infection rate percent and inhibition rate percent for the mice in each of the groups. Phagocytic tests of the abdominal macrophages and mononuclear macrophage system (MPS) were performed respectively.

RESULTS:

(1) Effect of Haelan 851, Platinum Formula, liquid oral nutritional beverage on the phagocytic function of the macrophages in the mice's abdominal cavities:

Twenty four hours after the finish of the treatment course, 60 mice in the six groups were injected peritoneally with 0.5ml of 5% chicken erythrocyte suspension. After an additional 16 hours, the abdominal fluid was collected. The animals were killed by dislocation of the cervical vertebrae, the abdominal skin was incised after disinfecting. 2.5 ml of Nank's solution was injected in through the peritoneum. The bellies were kneaded gently and a small hole was pierced on the peritoneum to withdraw 2 ml of abdominal fluid which was put into a small test tube and was well shaken. Then, the abdominal fluid was dripped on the slides to be incubated for 30 minutes in the incubator at a temperature of 37° centigrade. Then the floating chicken erythrocytes and other cells within were washed away with normal saline and blown dry to be fixed with methanol for five minutes and dyed with Giemsa-Wright stain and let dry. Slides were observed under oil immersion lens and phagocytes were counted. About 100 macrophages on each slide were observed continuously. The phagocytic percentage and indices were calculated according to the formulae listed below and the significant tests were performed.

$$\text{Phagocytic percentage (\%)} = \frac{\text{Number of macrophages that engulf chicken erythrocytes} \times 100}{\text{Total number of macrophages observed}}$$

$$\text{Phagocytic index} = \frac{\text{Total number of chicken erythrocytes engulfed}}{\text{Total number of phagocytes observed}}$$

The results (Table I) shows that the phagocytic function of the abdominal macrophages in mice decreased lower than the normal group ($P < 0.05$) after they had been infected with the malaria parasites. This observed level was lower than that of the normal group ($P < 0.05$).

Groups 1, 2 and 3 were respectively given Haelan 851, Platinum Formula, oral nutritional beverage plus K.Y. T. malaria medication, Haelan 851, Platinum Formula, oral nutritional beverage solely, and K.Y.T. malaria medication solely. The phagocytic percentages of the abdominal macrophages for those groups receiving the Haelan 851, Platinum Formula nutritional supplementation were significantly higher than the percentage in the control group ($P < 0.01$, $P < 0.01$, $P < 0.05$). After the Haelan 851, Platinum Formula, oral nutritional beverage was given to the mice of the normal group, the phagocytic index was evidently higher than that in the normal mice not given the Haelan 851, Platinum Formula nutritional supplementation ($P < 0.05$).

The parasite inhibiting rates in groups 1, 2, and 3 were 100%, 61%, and 96% respectively. The infection rate in the control group was 260%.