

## RINGKASAN

**PENGARUH PEMBERIAN PROVITAMIN B5 PADA PERTUMBUHAN  
*Plasmodium berghei* INTRAERITROSITER DAN KADAR GSH  
ERITROSIT MENCIT BALB/C YANG TERINFEKSI *Plasmodium berghei***

Meningkatnya resistensi obat antimalaria adalah salah satu hambatan dalam penanganan penyakit malaria, sehingga perlu mencari senyawa baru antimalaria. Provitamin B5 adalah senyawa yang bisa menghambat pertumbuhan *Plasmodium falciparum* sebagai penyebab kematian tertinggi. Provitamin B5 bekerja sebagai inhibitor kompetitif pada enzim pantotenat kinase sehingga fosforilasi asam pantotenat untuk pembentukan KoA tidak terjadi. Provitamin B5 juga meningkatkan kadar GSH sel eritrosit, yang bisa mempengaruhi pertumbuhan parasit.

Penelitian ini bertujuan untuk mengetahui pengaruh pemberian provitamin B5 terhadap pertumbuhan *Plasmodium berghei* intraeritrositer dan kadar GSH sel eritrosit mencit Balb/C yang diinfeksi dengan *Plasmodium berghei*.

Penelitian ini menggunakan infeksi *Plasmodium berghei* pada mencit sebagai model infeksi *Plasmodium falciparum* pada manusia. Mencit Balb/C jantan sebanyak 24 ekor dipilih secara random, dibagi menjadi tiga kelompok : kelompok kontrol, kelompok P1 dan kelompok P2, masing-masing mencit dalam kelompok diinfeksi dengan  $10^6$  *Plasmodium berghei* dalam 200  $\mu$ L darah mencit donor. Pada kelompok P1 dan P2 masing-masing diberi provitamin B5 sebanyak 1,4 g/kgBB/hari dan 5,6 g/kgBB/hari peronde, sedangkan kelompok kontrol hanya diberi aquades peronde sebanyak 400  $\mu$ L. Pemberian provitamin B5

mengikuti protokol yang terdapat pada *the 4-days suppressive test of blood schizontocidal action*. Pemeriksaan parasitemia dilakukan sebelum perlakuan (D0) dan sesudah perlakuan (D4), pada hari keempat dilakukan terminasi untuk pengambilan darah intrakardial yang akan digunakan untuk pemeriksaan GSH sel eritrosit dengan menggunakan metode Anderson. Penimbangan berat badan dilakukan setiap hari sebelum perlakuan untuk penyesuaian dosis.

Hasil yang didapatkan dianalisis dengan menggunakan *Anova*, yang dilanjutkan *LSD* jika didapatkan beda yang bermakna pada  $\alpha = 0,05$ . Pemeriksaan parasitemia menunjukkan adanya hambatan pertumbuhan parasit yang bermakna pada kelompok P1 (60,57 %) ( $p=0,000$ ). Kadar GSH sel eritrosit pada kelompok P2 lebih tinggi secara bermakna dibandingkan kelompok P1 ( $p=0,010$ ).

Kesimpulan penelitian ini adalah terjadi hambatan pertumbuhan parasit pada pemberian provitamin B5 sebanyak 1,4 g/kgBB/hari, sedangkan pada dosis 5,6 g/kgBB/hari tidak terjadi hambatan pertumbuhan *Plasmodium berghei*. Kadar GSH sel eritrosit mencit Balb/C yang terinfeksi *Plasmodium berghei* pada pemberian provitamin B5 sebanyak 5,6 g/kgBB/hari lebih tinggi dibandingkan kontrol, sedangkan kadar GSH sel eritrosit pada pemberian provitamin B5 1,4 g/kgBB/hari lebih rendah dibandingkan dengan kontrol.

**SUMMARY****THE INFLUENCES OF PROVITAMIN B5 ON INTRAERYTHROCYTE GROWTH OF *Plasmodium berghei* AND ERYTHROCYTE GSH LEVEL OF *Plasmodium berghei* INFECTED BALB/C MICE**

Increasing in antimalaria resistance inhibited malaria eradication, so that, the effort of finding new antimalaria drugs is needed. Provitamin B5 could inhibit the growth of *Plasmodium falciparum* as the agent causing high mortality rate. The action of provitamin B5 is being the competitive inhibitor of pantothenate kinases, the enzyme catalyzed pantothenic acid phosphorylation, first reaction in CoA biosynthesis. So that, the existence of provitamin B5 will interfere the metabolism and the growth of parasite. Provitamin B5 also increased erythrocyte GSH level, that could influence the growth of parasite.

The objective of this study was to find out the influences of provitamin B5 on the growth of *Plasmodium berghei* intraerythrocyte and the level of erythrocyte GSH of *Plasmodium berghei* infected Balb/C mice.

This study conducted the *Plasmodium berghei* research model of *Plasmodium falciparum* infected human. As many as 24 males Balb/C mice were separated randomly into three groups, namely control group, group P1 and group P2. As soon as parasitaemia reached 1–5 % the treatment should begin. Control group was administered 400  $\mu$ L aquades by gavage, group P1 administered 1.4 g/kgBW/day of provitamin B5 and group P2 administered 5.6 g/kgBW/day of provitamin B5 and all treatment by gavage. Provitamin B5 treatment followed the protocol in the 4-days suppressive test of blood schizontocidal action. Parasitaemia were measured at the first day before treatment (D0) and the end of

treatment before terminated the mice (D4). On the fourth day, the mice were terminated and blood samples from intracardiac was taken. Thus, blood samples conducted erythrocyte GSH measurement followed Anderson method.

The results were analysed by using Anova  $\alpha = 0.05$ , and continued by LSD if the result showed a significant difference. Parasitaemia measurement showed a significant inhibition of the growth of the parasites in group P1 (60.57 %) ( $p=0.000$ ), while in group P2 no significant difference from control group ( $p=0.801$ ). Erythrocyte GSH level decreased in all groups compared to normal value of erythrocyte GSH. Erythrocyte GSH in group P2 increased significant difference compared to group P1 ( $p=0.010$ ).

It is concluded that there is inhibition of the growth of parasites in provitamin B5 treatment at the dose of 1.4 g/kgBW/day, while at the dose of 5.6 g/kgBW/day no inhibition compare to control group. Erythrocyte GSH level increased in Plasmodium infected Balb/C mice administered 5.6 g/kgBW/day of provitamin B5, while the dose 1.4 g/kgBW/day decrease compare to control group.

## ABSTRACT

### THE INFLUENCES OF PROVITAMIN B5 ON INTRAERYTHROCYTE GROWTH OF *Plasmodium berghei* AND ERYTHROCYTE GSH LEVEL OF *Plasmodium berghei* INFECTED BALB/C MICE

**Abstract.** Provitamin B5 was the competitive inhibitor of pantothenate kinase-the enzyme needed in pantothenic acid phosphorylation, while the pantothenic acid was the essential nutrition needed in the growth of parasite. Provitamin B5 treatment would inhibit the growth of parasite and increased erythrocyte GSH level. The objective of this study was to find out parasitaemia level and erythrocyte GSH level due to provitamin B5 treatment to *Plasmodium berghei* infected Balb/C mice.

**Method.** 24 males Balb/C mice were infected by 200  $\mu$ L blood which contain  $10^6$  *Plasmodium berghei* intraperitoneally. Then, samples were separated randomly into three groups, namely control group, group P1 and group P2. As soon as parasitemia reached 1–5 % the treatment should begin. Control group was administered 400  $\mu$ L aquades by gavage, group P1 administered 1.4 g/kgBW/day of provitamin B5, group P2 administered 5.6 g/kgBW/day of provitamin B5, and all treatment by gavage. Provitamin B5 treatment followed the protocol in the 4-days suppressive test of blood schizontocidal action. On the fourth day the mice were terminated and blood samples from intracardiac was taken. Thus, blood samples conducted erythrocyte GSH measurement followed Anderson method.

**Result.** The results were analysed by using Anova  $\alpha = 0.05$ , and continued by LSD if the result showed a significant difference. Parasitaemia measurement using Percent method showed a significant decrease in group P1 (60.57 %) ( $p=0.000$ ), while in group P2 no significant difference from control group. Erythrocyte GSH level decreased in all groups. Erythrocyte GSH in group P2 increased significant compared to group P1 ( $p=0.010$ ).

**Conclusion.** Provitamin B5 inhibit the growth of parasites at the dose of 1.4 g/kgBW/day, but there is no inhibition at the dose of 5.6 g/kgBB/day. Provitamin B5 increased erythrocyte GSH level at the dose 5.6 g/kgBW/day, but decreased at the dose of 1.4 g/kgBW/day.

**Keywords :** Provitamin B5, Parasitaemia, Glutathione (GSH).

