Effect of infection with *S.chistosoma haematobium* on the Biochemical constituent of Mice (Balb /C)

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Abstract:

This study showed the effect of infection with ***S. haematobium*** on the biochemical constituent in mice . It was found that the parasite caused a reduction ($P < 0.05$) in protein and cholesterol content during 14, 18, 20 and 22 weeks post infection in both liver and kidney tissues; while it was not effected on muscle content of protein and cholesterol during period of infection.The highest number of parasites (intensity of infection)was seen after 18 weeks post infection .

Introduction

The host-parasite relationship has been investigated during the last century (Mackenzie and Gibson, 1970 , Mackenzie and Liversidge, 1975 , Rushed and Simba, 1982 ; Gupta and Agarwal, 1983 ; 1984 ; Al-Hadithi *et. al.,* 1990 ; Khudhair, *et. al.,* 1992 ; 1993 ; Elaine Borges, et. al., 2004). As an established fact , the presence of parasites in the host tissues causes definite and conspicuous changes ; but the pathological aspect has remained poorly studied in mammals as compared with that of fishes and bird (Elaine Borges, et. al., 2004 ; Van-Brand, 1973). However, there are some Physiological studies of various diseases of fishes (Van-Brand, 1973; Natarajain and Nair,1976 ; Joshi, 1981; 1985 ; Al-Hadithi, *et. al.,* 1990 ; Khudhair, *et. al.,* 1992.

The biochemical constituent (Protein, cholesterol and glycogen) in liver, gonads and muscles were found to be reduced in

some fishes infected with parasites(*Erqasilus SP*.) , acanthocephalan(Neoechinorhynchus aqillis),which is correlated with intensity of infection in fishes (Khudhair, *et. al.,* 1992 ; 1993). The glycogen content in liver , muscles and the blood glucose were reduced in some fishes infected with Trematodes and Trypanosomes (Joshi 1981). On the other hand, it was found that the biochemical content is relatively higher in cysts during the infection with *Euclinostomum heterostomum* (Gupta and Agarwal, 1983); while it was low in liver of fishes, which suggested that the presence of parasites in liver caused a depletion in glycogen content . The reduction in carbohydrates , protein and cholesterol in either liver, gonads and muscles decreased with increasing the intensity of infection (Rashed and Simba ,1982; Al-Hadithi *et. al.,* 1990 ; Khudhair, *et. al.,* 1992 ; 1993). Some studies showed that in the light infection , the glycogen of liver and muscles was slightly increased (Joshi 1985.

Most of the parasitic diseases were widely distributed among the peoples whom lived in places had low level of education, epidemic and contaminated environment , such diseases as schistosomasis which caused by *Schistosoma SP*.The infected people loss their weight and the ability of their work as a result of blood loss in urine and the inflammatory of urinary system by the parasites (Awad, *et. al.,* 1994). The morbidity of cercaria was associated with urinary tract lesion and increases in the width of ureter and kidney ; also sometimes caused cancer in urinary bladder and ultimately failure in the whole urinary system (Shaker, *et. al.,* 1992). However, the most pathological changes which associated with infection with cercaria of *Schistosoma SP*.. Caused by chronic immunological and inflammatory reactions which surrounded by ova of parasites (Awad,*et.a.*,l 1994 ; Lawn, Stephen , *et.al.,* 2000) .

This study is tried to investigate the intensity of infection with***S. Haematobium*** on the biochemical constituents in infected mice in relation to the period of exposure in liver, kidney and muscles tissues.

Materials and Methods:

This study has been carried out during the period 1994-1995 in Biol. Dept. Colle. Of Educa. Univ. of Basrah,IRAQ. Both males and females white mice (Balb / C) were brought from central Laboratories of Medical and Biological control / Baghdad; and has bred in a control animal house. The animals were fed standard diet Ad Libitum.

The preparation of cercaria of ***S. haeamtobium*** and the method of infection was followed by (Moor, et al 1949 ; Al-Sammaraie, 1994). Which is summarized as follow: A group of 28 male and female mice 6 weeks old ,were separated into 6 groups according to the time course exposure . In group one (N= 5) , the period of infection was

ten weeks. In group two (N = 5)the period of infection was 14 weeks . Group three (N= 5) , the infected period was 18 weeks. Group four (N= 4) the infected period was 20 weeks. Group five (N= 3) the infected period was 22 weeks . Group Six (N= 6) was used as control group. Each mouse was placed in a beaker 500 ml Contain a small amount of water for initiate the defecation . Then, the animal was transferred to another beaker with a capacity of 3000 ml contained fresh water just to submerge the legs of animals and was put 200 active cercaria which just released from the infected snails at 30Co for One hour of exposure and was focused a source of light on the beaker . After one hour ,the water was thrown gently and the animals were transferred to the cages well bedded with filter paper in order to dry the legs of mouse ; then the animals were put in colony cage till the end of experimental time .

Isolation of adult worm from infected mice :

At the end of experiment, the animals were killed by ether and dissected followed the method used by Smither and Terry, 1965; Al-Sammaraie,1994). A small incision was made in hepatic portal, then 50 ml of wash solution (8.5 g NaCL and 7.5 g of Sodium Citrate in one litter of distal water) was injected by hypodermic syringe in the right ventricle . The worms were pushed through insertion of hepatic vein. The blood and the wash solution was passed through silk gauze of clothes in order to collect the worms. The collecting worms were transferred to buffer phosphate saline (BPS) at PH 7.2, and then the worms were counted .

After the collection of parasites , a small piece of liver, kidney and muscles were taken and kept at – 20C till assay for total protein , cholesterol and glycogen, and were measured by the method used by Khudhair, et.al., 1992 and 1993.

Statistical analysis :

The parameters measured were statistically analyzed using simple "t" test and the result was considered statistically significant at 5% limit.

Result :

The effect of infection with S. haematobium on the biochemical constituent in liver , kidney and muscles in relation the time of infection was shown in Fig. 1-3 . The biochemical contents on twenty two weeks' time of infection for all tissues was estimated .

The protein content in liver, kidney and muscles after 10 weeks of infection was not changed , but the protein content in kidney and liver was reduced ($P< 0.05$) on 14 , 20 and 22 weeks post infection. Fig. 1.

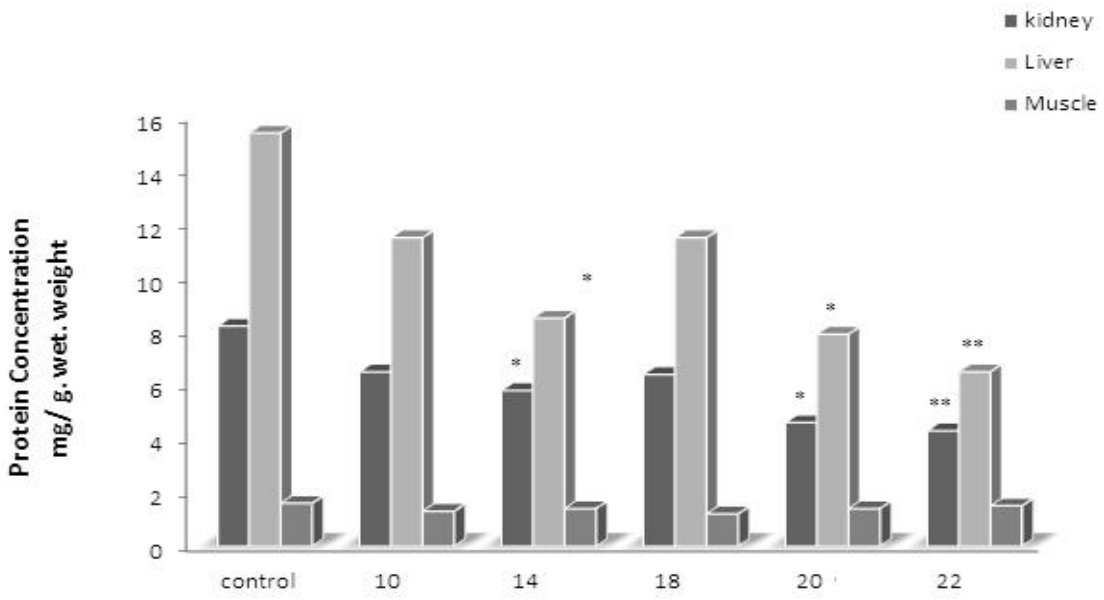
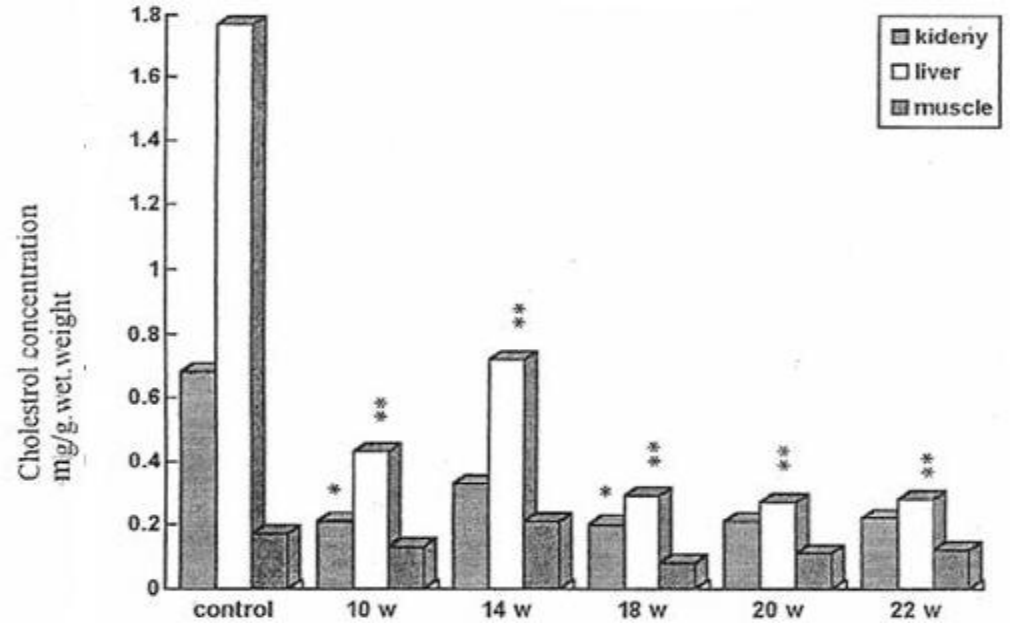


Figure 1 : Protein concentration in different tissues according to the period of infection

**P < 0.01 , *P < 0.05

The cholesterol content in liver was reduced (P< 0.05) during all period of infection; while it was reduced (P < 0.0 5)only on 10, 14 and 18 weeks post infection in kidney . The cholesterol content in muscles during course of infection was not changed compared with control animals Fig.2



Infection period (weeks)

Figure 2. Cholesterol concentration in different tissues according to the period of infection. ** P < 0.01., * P < 0.05

Table -1- The intensity of infection in mice ($\bar{X}$±*S.D* worms/ mouse)with different infection period (weeks)

10 weeks N=5	14 weeks N=4	18 weeks N=5	20 weeks N=5	22 weeks N= 3
8.2 ± 4.73	8.75 ±5.76	16.0 ± 5.25	8.0 ± 4.04	8.66 ±6.19

The glycogen content in liver and kidney was not significantly changed during all period of infection in all tissues Fig. 3 . Table 1 showed the number of worms (intensity of infection) in each mouse during the infections period. The higher number of worms were seen after 18 weeks post infected .

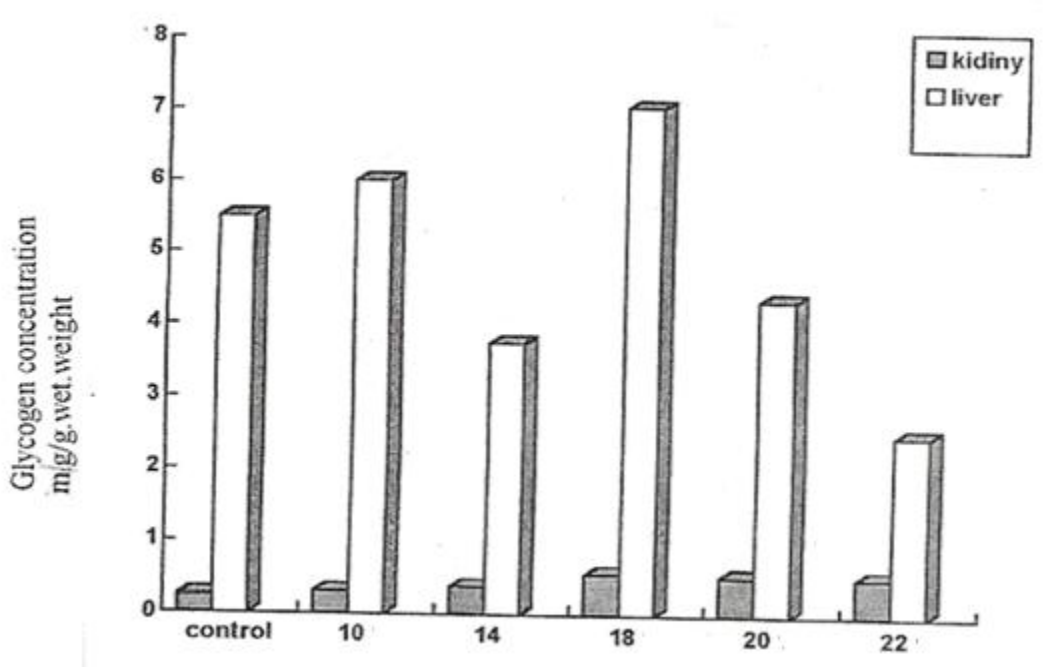


Figure-3.Glycogen concentrationin different tissues according to the period of infection.

**P < 0.01. * P < 0.05.

Discussion:

The reduction in protein content of liver and kidney after 14 , 20 and 22 weeks of infection may be related to the losses of blood in urine and the inflammatory of liver and kidney causes by presence of parasites (Stephenson,1993 ; Hanna, *et. al.,* 2003). In other studies it was noticed that the morbidity

of cercaria was associated with lesion in urinary tract and increases in the width of urethra and kidney. In some cases the infection leads to cancer in urinary bladder and ultimately renal failure may occurs (ElaineBorges, 2004 ; Shaker, *et.al.,* 1992 ; Hanna , *et.al.,* 2003).Chronic immunological reactions which surrounded by ova of the parasites were noticed (Awad , *et. al.,* 1994). Though the reduction in protein and cholesterol in both kidney and liver in this study may resulted from immunological and inflammatory reactions surrounded by the worms in liver.

The reduction in cholesterol contents in liver and kidney in this study might be related to the weakness of bile secretion which leads to decease the absorptive capacity of nutrient by intestinal mucosa or the uses of nutrient in the blood by parasites . The decreased in protein and cholesterol in liver tissue might be due to the reduced in ability of liver function. This concept has been confirmed by other studies (Rashed and Simba, 1982; Khudhair, *et.al.,* 1992 ;1993 ; Joshi 1985; Al-Sammaraie 1994)

In this study, it was found that the higher intensity of infection was after 18 weeks post infection. This is may related to the fact ,that, the worms of ***S. haematobium*** reached its plateau of maturation and development during this period of time. This concept was confirmed by the report of UNCEF (Manssy et. Al., 1998 ; UNICEF 1993).On the other hand, the highest number of parasites seen after 18 weeks , might be related to the meeting of both of males and females of parasites in the hepatic portal vein. The reduced number of parasites in the long time of infection, may relate to the protective immunity gained by animals against the parasites . The responsiveness of immunity in a period less than 18 weeks, was not well detected ,might be due to blocking antibody. This concept agreed with the finding of other investigators (Hanna *et. al*., 2003 ; Mansy *et. al.,* 1998 ; Butter W0rth, et. Al., 1988 ; Ismail *et.al.,* 1988 .

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تأثير شدة الاصابة بطفيلي البلهارزيا *S. haematobium* على المحتوى الكيميائي في الفئران

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المستخلص

أوضحت الدراسة تأثيرات شدة الاصابة بطفيلي البلهارزيا ***S. haematobium*** على المحتوى البايوكيميائي في الفئران. لوحظ ان الطفيلي يسبب انخفاضاً في محتوى البروتين و الكولسترول بمستوى معنوي $P < 0.05$ في كل من الكبد والكلية خلال فترات الاصابة لمدة 14،و 18 و 20 و 22 أسبوعا بعد الاصابة . في حين لم يُظهر الطفيلي أي تأثير على البروتين و الكولسترول في العضلات. لوحظ أن أعلى كثافة للطفيلي في الفئران بعد 18 اسبوعاً من الاصابة .