Study of White Blood Cells Changes in Mice Infested with Gamma Rays Radiant and Not Radiant Fertile Protoscolices of Echinococcus Granulosus

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Summary:

Background: *cystic echinococcus is a chronic zoonotic parasitic disease.*
Objective: *To investigate the white blood cells changes in mice following the infestation with gamma rays radiant (and not radiant) fertile protoscolices.*
Methods: *120 mice were divided into six equal groups: groups A. B, C, D and E were administered intraperitoneal gamma rays radiant fertile protoscolices 5, 10, 15, 20 and 25 Gray. After a month with the challenge dose, blood picture were measured and compared to those of the natural infection or the control.*
Results: *The differential white blood cells count for the groups A and B with 5 and 10 Gray, showed increase of neutrophil, but decrease of Lymphocytes from the first week to the eighth week. The study showed that there was no change in the number of monocytes and eosinophils during the same period for all groups. Groups C and D (20 and 25 Gray) showed the increase of Lymphocytes, but decrease of neutrophil. Controls showed increase of neutrophlis, monocytes, eosinophils, but decrease of Lymphocytes.*
Keywords: *gamma rays, fertile protoscolices, white blood cells, mice.*

Introduction:

Echinococcosis {cystic echinococcus) is a chronic zoonotic parasitic disease due to infection with Larval stage (hydrated cyst) of the small dog tapeworm Echinococcus granulosus[1 "'].

This parasite is found world wide and causes serious public health problems in certain parts of the world[12"3*41].

Humans can accidentally become intermediate host by ingesting the egg of the tapeworm"" , and the wide variety of animal species that act as intermediate hosts and domestication (sheep, cattle, goat/ . There are economic losses from the condemnation of affected organs' ' ' '.

There are several recent reports describing CE in humans and animals as an emerging or reemerging disease or a problem of increasing concern"[1] Cystic echinococcosis is of cosmopolitan distribution with different prevalent rales in various parts of the world, but the Mediterranean area and the middle east are considered as endemic regions[1"]

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Materials and methods

One hundred and twenty male (28-35 days old) were participated in this study, divided random!) to six equal groups A. B. C. D. E. F.

The first five groups A. B. C. D. E were injected intra-peritonealy with 2000 fertile radiant protoscolices. those protoscolices were taken from hydrated cysts *of* liver and lung of sheep origin smyih(1964) , after exposing the fluid of the cysts to Gamma rays Co 60 wave length 10" >-81.58416 by varying radiation dose of 5. 10. 15. 20. 25 Gray for a period of 1.2. 2.4. 3.6.4.8. 6 min. respectively.

The mice in group F were injected with protoscolices which was not exposed to Gamma rays were left as natural infections (control group).

Then the first five groups A. B. C. D. E (that were injected with radiated protoscolices) were injected by challenge dose consisted of 2000 fertile protoscolices intra-peritoneaK.

After a month the mice injected with the challenge dose to end of the experiment, the differential white blood cells were measured according to Sood (1987V[21].

Thin and thick blood smear were made from

the mice, these smears were stained b> Right Stain.

Results :

The result of the differential count of white blood cells after a month o\' administrating the challenge dose for the groups A, B in which the mice were injected with radiated protoscolices with a low doses 5. 10 Gray, showed the increase of neutrophil. In group A the increase was from 17 in the first week to 28 in 8 week, as for group B the increase was from 19 to 40 during the same period.

It also showed the decrease of Lymphocytes, which was from 80, 78 in the first week to 69. 57 in the eighth week in groups A and B respectively.

The study also showed that there was no variation (change) in the number of monocytes and eosinophil, during the same period for all the groups A. B or the C. D whether they were injected with a low dose (5. 10 Gray) or a high one (15. 20. 25 Gray).

The results of the W.B.C differential count of groups high doses of radiation (15. 20. 25 Gray), showed the increase of Lymphocytes, from 60 in the first week to 70 in the eighth week in group C in which the mice were injected with the dose 20 Gray, and from 70 to 81 during the same period in group D (25 Gray) in which the mice were injected with the dose of 25 Gray.

It also showed the decrease of neutrophil in the groups C and D. decrease from 37. 28 in the first week to 28, 16 in eight week respectively.

The differential count of white blood cells in the control group (natural infection) showed increase of neutrophil. monocytes, eosinophil. but decrease o(Lymphocytes.

Table I: Lymphocytes

Group	First week	second week	four week	six week	eight week
A (5Gray)	NO	77.3	76	70.5	69
B (10Gray)	78	70.75	72.3	61.65	57.6
C(15Gray)	67.4	67.6	69.8	70.05	70.85
D(20Gray)	60	60.45	62.65	69.95	70.65
E(25Gray)	70	70.45	71.45	79.5	81.25
F (control)	80	70	70	68	66.1

Table 2: Neutrophil

Group	First week	second week	four week	six week	eight week
A (5Gray)	17	20.5	21.4	27.35	28
B(10Gray)		27.35	25.6	36.25	40.05
C (15Gray)	;o.5	30.4	27.95		26.7
D(20Gray)	37	37.3	35.15	27.85	27
E(25Gray)	28	27.25	26.25	18.05	16.4
F (control)	16.6	22.5		26	26.9

Table 3: Eosinophil

Group	First week	second week	four week	six week	eight week
A (5Gra\)	1.5	1.3	1.6	1	1
B(10Gra\)	1	1.15	1.25	1	1.05
C(15Gray)	1	1.15	1.25	1.25	1.1
D(20Gray)	1.5	1.35	1.2	1.1	1.05
E(25Gray)	1	1	1	1.35	1.35
F (control)	1.1	1.5	2.2	2.5	3

Table4:

Group	First week	second week	four week	six week	eight week
A (5Gray)	1.5	0.9	1	1.15	
B(10Gray)	2	0.75	0.9	1.1	1.3
C(15Gray)	1.1	0.85	1	1.5	1.45
D(20Gray)	1.5	0.9	1	1.1	1.3
E(25Gray)	1	1.3	1.3	1.1	1
F (control)	2.3	2	2.8	3.5	4

Discussion:

Blood sample of mice that were injected with fertile protoscolices that were exposed to a low doses of radiation (5 and 10 Gray), showed increase of neutrophil and decrease of the Lymphocyte but monocytes and eosinophil remained at the same level.

The decrease of Lymphocytes was due to the low dose of radiation which cause the expansion of the blood vessels and thus the internal cells were enlarged and lorn which permitted the escape of the Lymphocytes and finally Lymphopenia (Woolf, 2000)[H]

As for the blood samples of mice that were injected with high doses of radiation, showed decrease of neutrophil and increase of Lymphocyte. this because of hyperplasia " " .

Hyperplasia causes increase of Lymphocytes which raises the activity of macrophage and attraction of other inflammatory cells (neutrophil) to the point of infection or the place of parasite, that caused general decrease of cells in the peripheral blood [25-26]

It was noticed that there was increase of monocytes, eosinophil. neutrophils and decrease of Lymphocyte in the control group (natural infection), this compromised with Kroes and Tanner (1987)"[71].

Also Ali-khan (1987a) proved increase of Lymphocytes, eosinophil, neutrophil and decrease of Lymphocytes due to the infection

with protoscolices of Echinococcus granulosus. and said that there was increase of neutrophil and decrease the Lymphocytes caused by the infection with secondary hydrated cyst of Echinococcus Multilocularis. it was believed that the movement of white blood cells towards the center of the infection (Parasites)and the activity of these cells to control the growth of secondary hydatid cyst especially the macrophage which has the ability to destroy the protoscolices that causes unstapilaty of white blood cells.

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