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The effect of *Trichomonas Muris* parasite on some blood standards in mice.

Azhar abbas Ashour

College of Education , University ALHamdaniya ,

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Corresponding Author:

Name: Azhar abbas Ashour

E-mail: Hhssnn809@gmail.com

Tel:

ABSTRACT

This study was conducted in College of Science, University of Mosul, it aims to identify the intestinal parasites that affect mice and their effect, this was done by collecting 37 mice, 22 of which were used as a control group, when a microscopic examination of the contents of the intestines of these animals is observed the presence of parasites *Trichomonas Muris*, during the period 21/10/2019 to 20/11/2020. The number of mice infected with one parasite was 12 mice infected with two parasites was nine, while the rest were free of intestinal parasites. With regard to the effect of these parasites on their hosts, an intestinal decrease was observed in the value of both haemoglobin and the volume of compressed blood cells in each of the infected mice compared to the controlled group. The infection, especially the double effect in the mice, caused a significant increase on the total number of white blood cells and an increase in the number of neutrophils and eosinophils and a significant decrease in numbers of lymphocytes cells at $p > 0.05$.

Introduction

One of the most common diseases in developing countries is infection of the intestinal parasites, as intestinal parasites also cause various diseases, including giardiasis, amoebiasis, balantridiasis, and Trichomoniasis[1].

These parasites are moving between their various functions quickly, aided by weak health conditions, the use of unhealthy water sources and fluctuations in environmental conditions [2]. In our world, intestinal parasites have become able to transmit rapidly, which has led countries, especially developed ones, to focus again on research in the diseases caused by these parasites due to their negative impact on the health and nutritional status of the population[3].

The intestinal parasites that live and reproduce in rodents may be transmitted to humans, causing to have serious and different diseases due to the prevalence of these parasites in rodents and depending on the geographical location, Surveys conducted around the world have shown a marked variation in the prevalence of these parasites, depending on many factors, including climate, environmental conditions, and the age of the host and the seasons [4].

Food contamination with the feces of rodents or direct contact with them may be cause the spread of diarrheal disease. There are also many parasites in the

gut of rodents, the most important of which is *Trichomonas muris* and *Necator americanus* [5,6] .

As a result of the dangers and disadvantages of the intestinal parasites and the transmitted diseases of the human being and in view of the close relationship between humans and rodents, our current research aimed to investigate the most important types of parasites that make from the mice hosts, as well as showing the effect of these parasites on their hosts by measuring changes in the values of some blood parameters as well as the numbers of white blood cells of these animals.

Trichomonas muris is the sort of a primary flagellar parasites, formerly known as trichomonas, but now it has been separated and considered separate due to absence of shield and appearance and presence of three internal flagellines includes *Trichomonas foetus* that affects cows and *trichomonas suis* that affects nasal passages, intestines, colon and rectum in pigs [7,8] .

Materials and Methods

Testing samples:

The study was conducted during (2/10/2019) till (20/1/2020) ,

which included collecting mice were obtained from houses located in separate areas within the vicinity of the city of mosul, caught with special traps designed

for this purpose. The animals were transported directly by special cages to a laboratory in the College of Science at the Mosul University, and the animals were provided with a quantity of water and a food diet in order to keep them alive until they were dissected. The animals were drugged with chloroform, then anatomized in the dissection dishes, by placing the animal on its dorsal corner in the dish, holding hands and feet with needle, syringe and drawing blood from the heart using 3-ml medical syringes, and the animal was anatomized by cutting the outer skin from the back of the animal to the end of the cage and carefully cut the mesenteric membrane to protect internal organs from damage[3].

Testing blood:

Blood samples taken from animals were performed, which included measuring the size of packed volume cells, the amount of hemoglobin, and the total number of differential leukocytes, according to [4,9,10]. The data were analysed statistically using the electronic calculator according to spss, and the least significant difference test was conducted at level 0.05 and 0.01, depending on [11].

Results:

Table (1) shows that the number of the tested mice was 37 mice. 12 of them infected with one parasite and 5 mice recorded more than one parasites, while the number of the empty mice was 22 mice and it was considered a control group.

The effect of single and double infection on some blood values of mice is shown in Table (1). It is noted that the value of hemoglobin and the volume of

packed blood cells increased significantly in the control group compared to the rest of the groups (with single or double infection), which did not differ significantly.

As for the total number of white blood cells, it is noted in Table (1) that the group of mice infected with the *T.muris* parasite recorded the highest number.

As for rats infected with one parasite, the numbers of white blood cells have decreased in comparison with the rest of the groups, and they did not differ significantly between them. Regarding the differential number of leukocytes, the number of dendritic cells increased significantly in the groups of mice with single and double infection compared to the control group.

Regarding the acid cells, it is noted that their proportions increase in the groups of mice infected with parasites compared to the control group.

While the numbers of lymphocytes, they decreased significantly in groups of single-infected mice compared to the control group that recorded these cells (table 1). Regarding to the single core cells, table (1) shows that the number of double infection mice (*T.muris*) showed a significant increase in the number of cells but they didn't differ significantly from the control group and the rest of groups. While the *t.muris* group showed a significant decrease in the number of cells. While the basal cells, they weren't showed in each control group and the single and double infection groups respectively.

Table 1: Types of parasites found in mice intestines and the number of the infected mice, and values of some of blood standards

Parasite	No.	Rate %	Hb/gr 100mlm	PCV %	WBC/mlm
<i>T.muris</i>	12	13.52	8.65b $\pm$ 0.44	27.00 $\pm$ 34	8425.00 c $\pm$ 121.93
<i>H.nana</i> + <i>T.muris</i>	3	5.88	7.00b $\pm$ 0.50	22.00b $\pm$ 1.73	10266.66a $\pm$ 120.18
Control	22	43.13	10.95a $\pm$ 0.29	33.86a $\pm$ 0.78	9936.36 $\pm$ 87.91
Total	37				

significant differences under probability $p \leq 0.05$

Table 2 : Types of parasites found in mice intestines and the number of the infected mice, and values of some of blood standards

Parasite	No.	Neutrophil %	Acido-phil %	Basophil %	Lymh	Single core
<i>T.muris</i>	12	5.50a $\pm$ 1.43	3.00ab $\pm$ 0.10	0.00	34.47c $\pm$ 6.77	9.18c $\pm$ 0.37
<i>H.nana</i> + <i>T.muris</i>	3	47.00a $\pm$ 0.33	3.00ab $\pm$ 0.57	0.00	38.66b $\pm$ 1.20	11.33a $\pm$ 0.33
Control	22	41.38c $\pm$ 0.58	1.54ab $\pm$ 0.29	0.00	46.95a $\pm$ 0.57	0.13ab $\pm$ 0.35
Total	37					

significant differences under probability $p \leq 0.05$

Discussion

The incidence of *T.muris* parasite in mice was the highest 13.52% compared to the remaining double infection 5.88 (table 1).

Thus, it was found that mice are more likely to be infected with the *T.muris* parasite. The cause of the spread of *T.muris* largely may be due to the fact that it is a primary that has a single phase and is easy to

transfer between its functions due to its direct transmission and its uncomplicated life cycle[6].

The infection of mice with parasites caused a decrease in the values of hematological parameters (HB and PCV)

The reasons for the decline may be due to the inability of the animals to reuse the lost iron in the intestine[7,12]. The purpose is to build hemoglobin and the formation of red blood cells due to its

consumption by parasites or due to the fact that the blood-analyzing factors produced by adult worms play a role in anemia [7].

The number of white blood cells in mice showed a significant increase, indicating the first clear immune response, thus affecting the percentages of their species in general. The most important characteristic of the parasitic infection is the high citrus percentage, eosinophilia. In general, increased citrus numbers in the peripheral blood is one of the signs of the host's response to parasitic infection [12]. The increase occurs in response to the release of histamine, especially since this substance is a chemotactic agent, the release of histamine from its granules helps increase citrus fruits, and this occurs during parasitic infection or allergic conditions [13, 14].

The moral increase in the ratios of neutrophils and the significant decrease in ratios of lymphocytes in mice occurs due to the state of the immune response due to the fact that neutrophils represent the first line of defense. As for the decrease in lymphocytes, it is due to the isolation of these cells from the bloodstream and their filtering into the liver tissue and the occurrence of what is called cellular leaching. Immune response to the host [11]. As for the basal cells, their ratios were not different in each of the cases of single and double infection from the control group.

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As for the preparation of neutrophils. It showed a significant increase, especially in those with a bilateral infection, which means that a bilateral infection is able to stimulate the immune response compared to a single infection that cannot stimulate the immune system and a decrease in the numbers of lymphocytes in these animals may be attributed to the migration of these cells to the tissues and the status of cellular filtration[13].

The decrease in the number of white blood cells in mice may be due to the breakdown of white blood cells, especially lymph from them, or it may be due to the rapid flow of white blood cells from the bloodstream into the lymph nodes[9].

Conclusions

Through our experiment to examine the mice, 37 mice to know whether the parasite affects blood parameters. We conclude that the group of healthy mice (control group) (22 mice more number than of infected mice, single or double) more than one parasite.

We also note that the white blood cells increase the percentage in infected mice with single and double infection with more than one parasite compared to the group of mice free from parasites (the controlled group). As mentioned in table (1)

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تأثير طفيلي الترايكوموناس (داء المشعرات الفارية) على بعض متغيرات الدم في الفئران

ازهار عباس عاشور

كلية التربية , جامعة الحمدانية , الموصل , العراق

الملخص

اجريت الدراسة الحالية في كلية العلوم /جامعة الموصل, والتي تضمنت تشخيص الطفيليات المعوية التي تصيب الفئران وتأثيراتها على متغيرات الدم لهذه الفئران, عن طريق جمع 37 فارة, وان 22 منها اعتبرت مجموعة السيطرة, بينما العدد الباقي من الفئران شخضت مجهريا . Trichomonas muris باصابتها بطفيل المشعرة الفارية.

عدد الفئران المصابة بطفيل كانت 12 وعدد الفئران المصابة ذات الاصابة المزدوجة كانت 3 بينما بقية الفئران كانت غير مصابة. فيما يتعلق عن تأثير هذه الطفيليات على مضائنها, لوحظ انخفاضاً معنوياً في مستويات كلا من الهيموكلوبين, وخلايا الدم المضغوطة لدى الفئران المصابة مقارنة مع غير المصابة, ايضاً الفئران ذات الاصابة المزدوجة لوحظ لديها زيادة معنوية في العدد الكلي لخلايا الدم البيضاء (زيادة في عدد العدلات والحمضات) عند مستوى $p > 0.05$, بينما لوحظ انخفاض في عدد الخلايا اللمفية.