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Review: The Effect of Sarcocystis on Hematological Parameters

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ABSTRACT

The parasite Sarcocystis is one of the main causes of a number of common diseases among humans and animals. The global disease that is transmitted from animals to humans is known as sarcoidosis. The production of over 200 distinct species of myocystosis is observed, with variations depending on the specific infection type and the characteristics of the ingested material (whether it is thoroughly cooked or lacks purification) in relation to human consumption. Sarcocystis is a highly prevalent protozoa found worldwide. It has the ability to create cysts of various sizes and shapes within the tissues of intermediate hosts, which encompass a wide range of animals such as humans, mammals, reptiles, and birds. Sarcocysts, being an obligatory parasite, rely on hosts in order to carry out their life cycle. The parasite utilizes herbivorous, omnivorous, and plant carnivores as its intermediate hosts, whereas carnivores serve as the definitive hosts for this particular parasite. This review concluded that Sarcocystis infections can have a significant impact on various blood parameters, including hematological and biochemical markers, and can lead to alterations in red blood cell count, hemoglobin levels, and hematocrit values. These changes can result from the parasite's ability to invade host cells and disrupt normal physiological processes. Additionally, the presence of Sarcocystis in the bloodstream can trigger an immune response, leading to an increase in white blood cell count and other inflammatory markers.

Introduction

The parasite Sarcocystis is one of the main causes of a number of common diseases among humans and animals. The disease that spreads from animals to people around the world is called sarcoidosis. The production of over 200 distinct species of myocystosis is observed, with variations dependent upon the specific infection type and the characteristics of the ingested

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material (whether adequately cooked or lacking purification) within the human body. Sarcocystis, a protozoa found worldwide, is known for its ability to create cysts of various sizes and shapes in the tissues of intermediate hosts. These hosts encompass a wide range of animals, such as humans, mammals, reptiles, and birds. Sarcocysts, being an obligatory parasite, rely on hosts in order to carry out their life cycle. According to Michael (2017), the parasite utilizes herbivorous, omnivorous, and plant carnivores as intermediate hosts, while carnivores serve as definitive hosts for this parasite.

Sarcocystis is a variety of intracellular parasites and the most pervasive parasite that contaminates a great many creatures and can taint people. The pathogen has the ability to infect a diverse array of animal species, including the human population. The parasites in question have an intricate life cycle that encompasses two distinct hosts, namely a definitive host and an intermediate host (Rosenthal, 2021). The definitive host is often a carnivorous mammal, such as a canine or feline, but the intermediate host encompasses herbivorous or omnivorous animals, including humans (Bhatia, 2000). The disease can prompt different clinical appearances, requiring adjustments for hematological boundaries. Understanding the effect of Sarcocystis contamination on hematological boundaries is urgent for precise findings and powerful treatment (Metwally *et al*., 2013).

Four species of Sarcocystis were found in sheep. S.ovifelis (which is the same as S. gigantea) and S. medusiformis are non-pathogenic and are passed on by felids. S.ovicanis (which is the same as S. tenella) and S. arieticanis, on the other hand, are pathogenic and are passed on by canids, which are the definitive hosts. (Aysen *et al*., 2007).

Sarcocystis parasites live in the striated muscles of the intermediate host, where they make cysts that contain thousands of infectious sporozoites. When the definitive host consumes the infected tissue, the cysts are digested, and the sporozoites are released. These sporozoites then invade the intestinal wall of the definitive host and multiply, completing the life cycle (Melinda et al., 2010).

While the main site of infection for Sarcocystis parasites is the muscles, they can also affect other organs, including the lungs, heart, and kidneys. Upon pathological examination, multiple petechial hemorrhages were seen on the surfaces of the lungs, heart, and kidneys. Platelet count, which is responsible for blood clotting, can also be affected by Sarcocystis infection. Some studies have reported a decrease in platelet count during Sarcocystis infection, which can lead to a bleeding tendency and impaired clot formation (Hornok *et al., 2015)*.

The objective of this particular investigation was to evaluate the impact of Sarcocystis infection on various hematological parameters. Hemoglobin levels: An infection caused by Sarcocystis can result in anemia, which is characterized by decreased levels of hemoglobin in the bloodstream. Anemia is a condition that arises from the destruction of red blood cells or the impaired production of new red blood cells. According to Spickler (2020), the parasites have the potential to induce harm to the host's red blood cells, resulting in a reduction in hemoglobin levels.

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Leukocyte count: Sarcocystis infection can affect the white blood cell count in the blood. White blood cells are essential in the immune response as they aid in combating infections. In the event of an infection, it is common for the body to react by elevating the synthesis of white blood cells. Hence, a rise in the quantity of white blood cells, known as leukocytosis, may be observed in individuals with Sarcocystis infection (Nasr et al., 2013).

Eosinophilia refers to the presence of eosinophils, a specific type of white blood cell. These cells play a role in allergic responses and fighting against parasitic infections. Sarcocystis infection can trigger an immune response, leading to an increase in the eosinophil count in the blood. This condition, known as eosinophilia, is often associated with parasitic infections (Mejia & Nutman 2012).

Liver function tests: In cases where Sarcocystis parasites invade the liver, liver function may show abnormalities. Inflammation or injury to the liver may be indicated by an increase in liver enzymes like alanine aminotransferase (ALT) and aspartate aminotransferase (AST), and can be caused by the formation of muscular cysts, the rupturing of muscle fibers, or sometimes by myositis.

Furthermore, Sarcocystis infection can impact the levels of certain biochemical parameters in the blood, such as serum proteins and liver enzymes. Indicators of liver injury or inflammation include an increase in the levels of the enzymes alanine aminotransferase (ALT) and aspartate aminotransferase (AST). (Nasr et al., 2013) found that changes in serum proteins, especially levels of albumin and globulin, can show the overall nutritional status and whether or not there is an inflammatory response.

Infections with various parasites can have different effects on blood parameters. Here are some examples of common parasites and their potential impact on blood parameters:

Red blood cells are susceptible to Plasmodium (malaria), which is a parasite. The infection can lead to several changes in blood parameters, including hemoglobin levels. Malaria parasites multiply within red blood cells, causing their destruction and leading to a decrease in hemoglobin levels. The count of red blood cells Malaria has the potential to result in a reduction in red blood cell count, which can subsequently lead to the development of anemia. Platelet count: In some cases of severe malaria, there can be a decrease in platelet count, which may result in a higher risk of bleeding (Mohans &An 2013).

Trypanosoma (African trypanosomiasis): Trypanosoma parasites cause African trypanosomiasis, also known as sleeping sickness. This infection can affect various blood parameters. White blood cell count: Trypanosoma infections can lead to an increase in white blood cell count, particularly during the early stages of the infection. Hemoglobin levels: Anemia is commonly observed in individuals with African trypanosomiasis due to the destruction of red blood cells. Eosinophilia: The eosinophil count may increase as a result of the immune response to the infection (Anosa, 1988).

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According to Esievo and Saror (1991), animal trypanosomosis is associated with several factors that contribute to the development of anemia, including hemolysis, sequestration of red blood cells, hemodilution, platelet aggregation, lipid peroxidation, hemorrhage, and malfunction of the bone marrow.

Schistosomiasis is caused by Schistosoma parasites, which are responsible for causing this parasitic disease that impacts the urinary and intestinal systems. The infection can have the following effects on blood parameters: Eosinophilia: Eosinophil counts tend to increase in response to Schistosoma infection. Hemoglobin levels: Chronic schistosomiasis can cause anemia due to chronic blood loss and inflammation (Malta *et al., 2022).*

Liver function tests: An infection with Schistosoma can cause liver damage or fibrosis, which may show up as abnormal liver function test results, such as high liver enzyme levels (Hu et al., 2021).

Conclusion

From this review, it can be concluded that Sarcocystis infection can have a significant impact on various blood parameters, including hematological and biochemical markers, and can lead to alterations in red blood cell count, hemoglobin levels, and hematocrit values. These changes can result from the parasite's ability to invade host cells and disrupt normal physiological processes. Additionally, the presence of Sarcocystis in the bloodstream can trigger an immune response, leading to an increase in white blood cell count and other inflammatory markers.

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