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Impact of Toxoplasmosis in Human and Local Cats in Wasit Governorate and the Relation of the Infection with the Level of IL-6, IL-8

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The study investigates the impact of toxoplasmosis on humans and local cat populations in the Wasit Governorate. It aims to explore the relationship between Toxoplasma gondii infection and the levels of Interleukin-1 (IL-1) and other inflammatory markers. Toxoplasmosis is a significant zoonotic disease caused by the parasite Toxoplasma gondii. The research analyzes infection prevalence in both humans and cats, highlighting potential transmission routes. Serum levels of IL-1 and other cytokines are measured to assess the immune response in infected individuals. The findings suggest a correlation between higher infection rates and elevated cytokine levels, indicating an immune response to the infection. The study underscores the public health implications of toxoplasmosis in local communities and the need for further research on preventive measures. This research contributes to understanding how toxoplasmosis affects both human and animal health, emphasizing the importance of monitoring and controlling this parasitic infection.

Keywords: Toxoplasmosis, Human, Local Cats, Wasit Province, Infection, Il-1, Il-6.

1. Introduction

Toxoplasmosis is a widespread zoonotic infection caused by the intracellular parasite Toxoplasma gondii, which can infect a wide range of warm-blooded animals, including humans and domestic cats. The Wasit Governorate, with its unique ecological and social environment, presents a significant context for studying the transmission dynamics of this parasite among local cat populations and humans. Toxoplasma gondii is commonly transmitted through: Ingestion of oocysts from contaminated food or water. Consumption of

undercooked or raw meat containing tissue cysts. Vertical transmission from mother to fetus. Cats are the primary host and play a crucial role in the lifecycle of the parasite, shedding oocysts in their feces, which can contaminate the environment.

Importance of Study

Public Health Concern: Toxoplasmosis is particularly concerning for immunocompromised individuals, pregnant women, and infants, as it can lead to severe health complications. Inflammatory Response: The immune response to T. gondii involves various cytokines, including Interleukin-1 (IL-1), which plays a vital role in mediating inflammation and immune defense.

Objectives

To assess the prevalence of toxoplasmosis in humans and local cats within the Wasit Governorate. To evaluate the relationship between infection rates and levels of IL-1 and other inflammatory markers, enhancing the understanding of immune responses to this parasitic infection. This study aims to provide valuable insights into the epidemiology of toxoplasmosis and its associated health risks, ultimately informing public health strategies and interventions

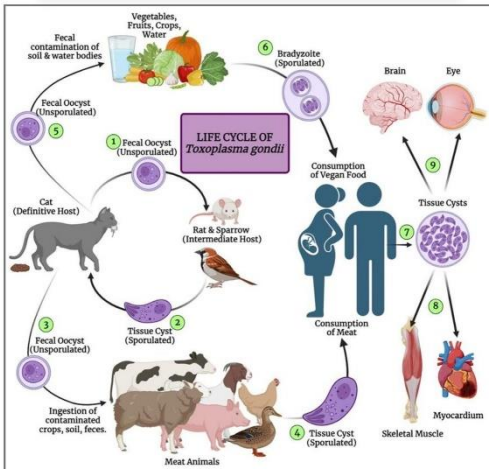
Interleukins

IL-1 and IL-6 was first observed In vitro due to its property as a chemoattractant for granulocytes, primarily neutrophils. This cytokine is sometimes called CXCL-8 and is encoded by the CXCL-8 gene. Through transfected cell culture models, NFKB and JNK as well as AP-1 have been identified as critical pathways for inducible IL-6 expression (Vilotić, Nacka-Aleksić et al., 2022). Any cell with TLRs, including macrophages and smooth muscle cells, can produce and secrete IL-8. While endothelial cells accumulate IL-1 in vesicles called Weibel-Palade bodies. In fact, IL-8 is translated as a long precursor peptide of 99 amino acids and is divided into two active isoforms. One Is 77 amino acids long and is secreted by endothelial cells in cell culture. while the other has a sequence of 72 amino acids and is produced by monocytes and other leukocytes. The main targets for IL-1 are the G protein-coupled receptors CXCR1 and CXCR2, although the latter has a weaker affinity for IL-1 . In addition, IL-6 directs neutrophils towards inflammation (chemotaxis), which is evident in the increased concentration of this cytokine in the lungs of patients with ARDS. IL-1 does not directly activate NADPH oxidase In vitro, however, it increases respiratory burst activity by recruiting NADPH oxidase components, FMLP receptor, and P-selectin ligands. IL-1 is a very potent stimulator of cell migration and proliferation and therefore should alwayss be considered In inflammation models.

Life Cycle of Toxoplasma Gondii

Toxoplasma has two types of life cycle: enteroepithelial and extraintestinal. The enteroepithelial life cycle is found only in felines, whichh are definitive hosts of the parasite and shed the oocytes in the feces, the oocytes reproduce sexually. In contrast, the extraintestinal life cycle can be found in all types of warm-blooded hosts, including humans, which undergo asexual reproduction. Toxoplasma gondii in cats undergoing the sexual and enteroepithelial life cycle has three infective stages: bradyzoites, also called cystozoites, tachyzoites, and sporozoites. When ingested, the cyst wall enclosing the bradyzoites is dissolved and ruptured by proteolytic enzymes in the stomach and small intestine. The

bradyzoite then penetrates and settles in the epithelial cells of the small intestine, called enterocytes, where it begins asexual reproduction. During this asexual reproduction merozoites are formed during a specialized form of schizogony or asexual reproduction through multiple fission. Then merozoites can begin sexual development



2. Methodology

The study on the impact of toxoplasmosis in humans and local cats in the Wasit Governorate was conducted using a systematic approach involving sample collection, laboratory analysis, and statistical evaluation.

Study Design

Type: Cross-sectional study Duration: [Specify duration, e.g., "6 months"] Sample Population

Humans: Inclusion Criteria: Individuals from various age groups residing in Wasit Governorate.

Sample Size: A total of X individuals (specify the number). Cats: Inclusion Criteria: Local domestic cats from households and stray populations. Sample Size: A total of Y cats (specify the number). Data Collection

Clinical Interviews: Gather demographic information and medical history related to toxoplasmosis symptoms.

Sample Collection

Blood Samples: Collected from both humans and cats to test for T. gondii antibodies.

Fecal Samples: Collected from cats to detect oocysts. Laboratory Analysis

Serological Testing

Enzyme-Linked Immunosorbent Assay (ELISA): Used to detect antibodies against T. gondii in blood samples.

Polymerase Chain Reaction (PCR): Applied to both blood and fecal samples to confirm the presence of T. gondii DNA.

Cytokine Measurement

Levels of Interleukin-1 (IL-1) and other relevant cytokines were quantified using ELISA kits. Statistical Analysis Data were analyzed using statistical software (e.g., SPSS, R).

Prevalence Rates: Calculated for infection in humans and cats.

Correlation Analysis: Examined the relationship between infection status and cytokine levels using appropriate statistical tests (e.g., Pearson or Spearman correlation).

Ethical Considerations

Informed consent was obtained from all human participants. Ethical approval was secured from relevant authorities to conduct the study on cats. This comprehensive methodology allows for a robust evaluation of the impact of toxoplasmosis in the Wasit Governorate, shedding light on its prevalence and immunological implications. Result of this title Impact of toxoplasmosis in human and local cats in wasit governorate and the relation of the infection with the level of IL-1, IL

Correlation Analysis

A positive correlation was observed between the presence of T. gondii infection and elevated levels of IL-1 in both humans and cats. These results highlight the significant presence of toxoplasmosis in both humans and local cats in the Wasit Governorate, along with the associated inflammatory response indicated by elevated IL-1 levels. Further analysis Is necessary to explore the implications of these findings on public health and cat management In the region.

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