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Research Paper

Study levels of prolactin , FSH, and LH hormones in pregnant women with *Toxocara spp.*

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Abstract :

Seroprevalence of toxocariasis during pregnancy, as immune responses may lead to infertility and miscarriage in a number of cases and any disturbance in the normal immune relationship between the mother and the fetus in the early stages of pregnancy. This study aims to **investigate the** physiological condition in pregnant women with *Toxocara* IgG. The study was conducted in the Dhuluiya district / Salah Al-Din Governorate from October 2021 to July 2022, and the samples were collected from pregnant women. The results **appeared a prevalence** of toxocariasis in pregnant women; **the** percentage of positive cases was 14%, and the percentage of negative cases was 86 % **with significant differences** ($P < 0.05$). **The level of prolactin hormone was found to be higher** in toxocariasis-positive infections (191.0 mIU/ml \pm 8.6) compared with negative samples (155.4 mIU/ml \pm 9.4) ($P < 0.05$). Also, FSH hormone level **was low** (0.225 mIU/ml \pm 0.025) in positive cases compared with negative (1.16 mIU/ml \pm 0.38) significant differences ($P < 0.05$). Moreover, LH hormone **was lower** in the positive cases (0.210 mIU/ml \pm 0.007) compared with the negative samples (2.120 mIU/ml \pm 0.103) **with significant differences** ($P < 0.05$). In conclusion, **the level** of prolactin hormone was increased in positive cases, while luteinizing hormone (LH) and follicle-stimulating hormone (FSH) were decreased in pregnant women positive for *Toxocara* IgG test.

Keywords: Prolactin FSH, LH, Keywords: *Toxocara spp.*,

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Introduction:

The presence of *Toxocara* in Iraq was first documented in 1957 (Leiper, 1957). Adult *Toxocara* worms live in the small intestines of dogs and cats. Eggs are excreted into the environment through animal feces and develop into infective stages within 3-6 weeks, infecting host animals, including dogs, cats, cattle, sheep, goats, rodents, birds, and humans through ingestion of food contaminated with the eggs (Rashid et al., 2022; Holland et al., 2017). The larvae emerge from the eggs after the host ingests and migrate to other tissues and organs, where they remain encapsulated in the third larval stage. In humans, larval migration results in ocular larval migrants (OLM) or visceral larval migrants (VLM) (Rashid et al., 2022).

One study showed a seroprevalence of toxocariasis during pregnancy, as immune responses may lead to infertility and miscarriage in a number of cases and any disturbance in the normal immune relationship between the mother and the fetus in the early stages of pregnancy is considered a major risk factor for miscarriage (Sohrabi et al., 2022).

In previous studies, the immune response against helminths has been evaluated, as the effect of hormones on immunity was observed, and it was noted that sex (whether male or female) has an important role in regulating the immune response in some cases of parasitic infection (Del Río-Araiza and Morales-Montor,2021). Hormonal regulation has been associated with reactivation of larvae that are transmitted (via the placenta or breast milk via the mammary glands) from the mother to the offspring, as in toxocariasis (Overgaauw and van Knapen, 2013). This study aims to investigate the physiological condition of pregnant women with *Toxocara* IgG through the surveillance of levels of prolactin ,FSH ,and LH

Methods:

Sample collection

The study was conducted in the Dhuluiya district of Salah Al-Din Governorate from October 2021 to July 2022, and information was collected from pregnant women based on a questionnaire that included: name, age, sex, profession, residence location, date of sampling, and animal acquisition. As for the collection of samples, it was done in the laboratory of Al-Duluiya General Hospital and the modern medical laboratory. Blood samples were collected by drawing 5 ml of venous blood with a medical syringe, blood was placed in laboratory tubes, serum was separated through centrifugation at 2000-3000 rpm for 20 minutes, then transferred to Eppendorf tubes and kept frozen at 20°C until testing is done.

Detection of *Toxocara* IgG

It was conducted by ELISA device (Bio Tik /USA) using SunLong /China ELISA kit.

Detection of hormones levels

Serum levels of Prolactin, LH and FSH were measured using the CL-900i device Mindary/ China

Statistical analysis

The results were analyzed statistically by applying the T-test to compare negative group with positive group and also to know the significant differences when a P-value was less than 0.05

Results:

Toxocara IgG detection

The results of the ELISA test for the prevalence of toxocariasis in pregnant women from the city of Dhuluiya, as shown in Table (1), showed that the percentage of positive cases was 14%, and the percentage of negative cases was 86%, as significant differences appeared at the level of probability $P < 0.05$.

Table (1) Percentages of cases of toxocariasis in the study group

Samples	Number	Percentage	Mean±SE
Positive samples	14	14%	0.441±0.135
Negative samples	86	86%	0.231±0.064
Total	100	100%	
T-Value = -1.98 P-Value = 0.04			

Detection of hormones levels

The results showed a high level of prolactin hormone (191.0 mIU /ml ± 8.6) in toxocariasis positive infections, with significant differences compared with negative samples for toxocariasis (155.4 mIU /ml ± 9.4) ($P < 0.05$) as shown in Table (2).

Table (2) Prolactin level in toxocariasis patients compared with non-infected patients

Samples	Mean mIU /ml ±SE
Positive samples	191.4±8.6
Negative samples	155±9.4
T-Value = -2.86 P-Value = 0.010	

The results showed a low level of FSH hormone (0.225 mIU /ml ± 0.025) in toxocariasis positive infections, with significant differences compared with negative samples (1.16 mIU /ml ± 0.38) ($P < 0.05$), as shown in Table (3).

Table (3) FSH level in toxocariasis patients compared with non-infected patients

Samples	Mean mIU /ml ±SE
Positive samples	0.225±0.025
Negative samples	1.16±0.38

T-Value = 2.46 P-Value = 0.018

The results showed a low level of LH hormone (0.210 mIU /ml \pm 0.007) in the positive infections, with significant differences compared with the negative samples (2.120 mIU /ml \pm 0.103) ($P < 0.05$) as shown in Table (4).

Table (4) LH level in toxocariasis patients compared with non-infected patients

Samples	Mean mIU /ml \pm SE
Positive samples	0.210 \pm 0.007
Negative samples	2.120 \pm 0.103
T-Value = 1.99 P-Value = 0.039	

Discussion :

The results of the current study in terms of the prevalence of toxocariasis were similar to other studies conducted in Iraq, as a study conducted in the city of Kirkuk showed that the prevalence of *Toxocara canis* and *Toxocara cati* infection was high in stray dogs and cats by 25.98 and 39.58%, respectively (Hassan and Barzinji, 2018). In previous years, the number of stray dogs and cats increased in Sulaymaniyah Governorate, especially in public parks and residential areas, which could greatly affect public health through the spread of zoonotic diseases, including Toxocariasis (Rashid et al., 2022). **The spread** of *Toxocara* spp. among domestic cats and dogs is related to their owners due to the lack of special deworming programs, which makes the prevalence of infection high and thus affects human health (Hade et al., 2018).

Río-Araiza et al. (2018) showed in their study that when infecting a group of rats with the *Toxocara canis* parasite, prolactin has a role in the cells of the immune system, as high prolactin in the blood generates a certain degree of parasite growth. Still, no larvae migrated to the mammary glands. Prolactin also plays a vital role in the functioning of the immune system and in stimulating the mammary glands to produce milk (Lucas et al., 1998). Prolactin acts by stimulating the secretion of immune cytokines and the expression of cytokine receptors, as well as a growth factor, and in disease states, increased levels of prolactin can lead to immune deterioration (Diaz et al., 2013).

Prolactin is one of the most important hormones involved in host immune regulation (Dzitko et al., 2010), and prolactin can induce antiparasitic activity (Dzitko et al., 2012). Other studies showed the effect of other parasitic infections, such as toxoplasmosis on prolactin levels in pregnant women in the city of Baghdad, as hormone levels increased in the infected group compared to women without toxoplasmosis (Hussein and Mohammed, 2022).

The life cycle of *Toxocara* spp. is complex. **It varies** according to the type of host, **such as the** host, the age of the host, and the physiological state (the presence of pregnancy or

the absence of pregnancy); as the larvae undergo a reactivation process represented by the migration of the larvae towards the uterus and mammary glands. When larval activation begins, an increase in the concentration of prolactin is observed in the blood (Río-Araiza et al., 2018).

Follicle-stimulating hormone (FSH) promotes and maintains the normal development of the gonads. Besides, FSH can regulate immunity by mediating the secretion of immune factors through follicle-stimulating hormone (FSHR) receptors distributed in the gonads (Sun et al., 2006).

Studies did not show the relationship between FSH and LH hormones during pregnancy with toxocariasis. However, these hormones were elevated in other parasitic infections, such as Toxoplasma infection in pregnant women, as Al-Jorani (2015) showed that the level of FSH and LH was high with significant differences ($P < 0.05$). While another study conducted on pregnant women from the city of Najaf showed that there was no relationship between changes in the levels of FSH and LH hormones with Toxoplasmosis (AL-Asady, 2017).

The common hypothesis of immune differences between males and females is the effect of sex hormones on the immune system, where a previous study showed that there is a great link between the immune system and the endocrine glands, and this, in turn, affects target genes in immune cells due to the presence of sex hormone receptors within immune cells, including: lymphocytes Macrophages, granulocytes, and mast cells (Klein, 2004). Finally, the current study showed the change level of hormones in pregnant with *Toxocara* infection.

Conclusions :

The current study indicates toxocariasis's effect on pregnant women's physiological condition during pregnancy. The level of prolactin hormones increased while luteinizing hormone (LH) and follicle-stimulating hormone (FSH) decreased in pregnant women positive for *Toxocara* IgG test.

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