Thi-Qar Medical Journal (TQMJ):Vol.(24),No.(2),2022
Web Site: https://jmed.utq.edu.iq Email: utjmed@utq.edu.iq
ISSN (Print):1992-9218, ISSN (Online):1992-9218

Estimation the Level of Interferon Gamma for Diabetic Patients Infected with Toxoplasmosis in Thi-Qar Province / Southern Iraq

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Abstract :

Toxoplasma is considered one of the most widespread parasites in the world and causes toxoplasmosis. What distinguishes this disease is that it is asymptomatic and is considered immunocompromised, the most vulnerable group to it, such as diabetic patients, because their bodies do not secrete the hormone insulin that helps in diabetes metablism. Therefore, the metabolic activity in their body is considered weak relative to healthy people. The current study were used the ELISA technique to find out the frequency of T.gondii in diabetic individuals and their relationship to IFN-Y and the effect of this cytokine on diabetic patients with toxoplasmosis by collecting 266 samples from Diabetic patients and 125 from healthy people, the study showed 35% of diabetic patients infected with chronic Toxoplasmosis. This study were showed a high level of IFN- γ in diabetic patients infected with toxoplasmosis (37.4 IU/ml) compared to diabetic patients without toxoplasmosis (16 IU/ml) .

Key words: toxoplasmosis, diabetic mellitus , ELIZA ,interferon gamma (IFN- γ)

Introduction :

Toxoplasma gondii is type of wide spread , common parasites among humen and warm-blooded animals. *T. gondii*, is the cause of zoonosis toxoplasmosis. According to reports, the disease has been discovered in thirty to fifty percent % of the people of earth, making *T. gondii* ubiquitous zoonosis globally[1] The felid (cat) family's members serve as the undisputed hosts. Toxoplasma (arclike form) gondii was first discovered by both (Nicolle ,Manceaux) in the tissues and blood ,*Ctenodactylus gondii*, in a north Africa rat ,was discovered in 1908.[2] *T. gondii* infection by consuming meat that contains live *Toxoplasma gondii* tissue cysts . subsequently consumption, bradyzoites emite from tissue cysts penetration the bowel tissues and begin the production of several asexual cycle occurs before to the sexual process [3] diabetic mellitus is One of the most significant

international public health concern of the 21st century . It is predicted that by 2030, there will be 552 million (or 7.7%) people suffering from DM. The condition is characterized by inability pancreas cells to secret insulin or decreased insulin synthesis and impaired insulin response in bodily tissues (insulin resistance) Patients with diabetes may be more likely to contract T. gondii due to the suppression of their immune systems. [4,5] Toxoplasma gondii may multiply and infect any nucleated host cell, which causes a number of inflammatory markers to be produced through acute inflammatory and development of specific immunity to antigen(*T.gondii*) are crucial component of immunity . As aresult, the several host's anatomical areas experience persistent inflammation[6].

IFN-γ Is one of dissolved cytokines that functions as the sole interferon of kind 2 class, and is essential for both innate and acquired immune system against protozoan, bacterial, viral infections and intra cellular parasite. Major Histocompatibility Complex class II is induced by IFN-, which is primarily secreted by specific type of lymphocytes for example $CD4^+$ T helper type 1 (Th1) cells, $CD8^+$ cytotoxic T cells, also produce from natural killer (NK) cells, as well as to a lesser extent by T lymphocytes, NKT, B lymphocyte , and qualified antigen-presenting cells (APCs)[7] .

Material and method

The Blood collection

blood samples were collected from 266 patients and 125 sample from healthy people (control) during July 2022 to December 2022 from diabetic patients whom entered Diabetic and endocrinology center in AL-Nasiriyah town / Thi-Qar province , southern Iraq .the age of diabetic patients were ranging from (16-86) and in both sex male female . Their residency were located between rural and urban cities,rural area . Five ml of blood were collected and 3ml of it were placed in gel tube to detect *T.gondii* and examine of interferon (IFN- γ) in diabetic patients and health control , serum were separated and then store -20 , 2ml of blood sample were placed in sodium citrate tube to conduct a cumulative analysis (HbA1c) to confirm whether the person had diabetic or not by using the cobas equipment originated from both (Rocha ,Hitachi) Germany –Japan companies ,[8,9] the statistical analysis was carried out according to the spss program

chi sequare ($\chi 2$) and p-value if $P \leq 0.05$ indicated high level of significant or $P>0.05$ indicated

Non-Significant

-Serological test for detection of *T.gondii* (IgG) and IFN-γ :

A serological investigation employing the ELISA test by using (DRG)kit Germany original to verify the presence of quantity and concentration discovered that the infection rate for chronic toxoplasmosis in Diabetic patients and healthy control , this technique were also used to measure

the level of (IFN-Y)by using (Fine test)kit from chines company to determine the level of it in the cases of diabetic patients with and without toxoplasmosis

Results:

The whole sample of diabetic people that prepared in the current study were 266 for serological detection of *T.gondii* (IgG) and (125) of healthy control by using enzyme linking immunoassay (ELISA) and the results were recorded (35%) of diabetic patients were seropositive for anti – *toxoplasmosis* antibody(IgG) . The outcome of the current study were shown the mean of interferon gamma (INF-γ) in diabetic patients infection with *T.gondii*(37.4) and more than mean (16)of

Case	INF-Y (Mean) IU/Ml
Patients With Diabetes Mellitus	16 IU/Ml
Patients With DM+*T.Gondii*	37.4 IU/Ml
Healthy Control Negative For Toxo	18.2 IU/Ml
Control Positive For Toxo	33.8 IU/Ml

diabetic patients without *toxoplasmosis* in compare to control with toxoplasmosis (33.8) and health control without toxoplasmosis (18.2) as shown in table (1).

Table (1): level of interferon gamma in diabetic patients with and without toxoplasma gondii-IgG antibody.

$\chi 2$=13.286 df=3

p-value =0.004

significant differen P≤ 0.05

Discussion :

Diabetes mellitus(DM) is type of the most common disorder among the elderly , which is linked to significant morbidity and mortality due mostly to cardiovascular and renal consequence from diabetes [10] .increase in diabetic as a result obesity change life style decreases physical activity, and genetic factors [11] .In the current study out of 266 samples, (35%) were positive for (IgG) anti toxoplasma because the extent of the infection due to exposure to cats and rats, a high number of risk factors, eating contamination food increasing environmental contamination،

consuming unwashed vegetables, under cooked meat, and ingesting soil-borne oocysts .This study is similar with another study[12] in Baghdad where The rate of infection with toxoplasma IgG (56.6%) and study of [13] in Iran where they found that the infection rate were reached to (70.7%).The study of [14] inconsistent with the current study when discovered The infection with toxoplasma (IgG) were 11%.

Interferon gamma (IFN-γ) cytokine family has a role in the maturation of innate and adaptive immune responses against diverse infections and pathogenic triggers. Originally identified as a proteinaceous material that protected nearby cells from virus infection when released by virus-infected cells, also it is released in some intracellular parasite like toxoplasma gondii[15]. these cytokines are now known Contributor to many of human diseases, as part of the standards regular tumor growth, cell differentiation, and autoimmune In some circumstances, macrophages emit IFN-γ, a cytokine that is largely made by antigen-activated T cells and NK cells. [16] .the outcome of the finding study were explained a highly concentration from (IFN-y) in diabetic patients whom infected with *T.gondii* compared with that patients without toxoplasmosis.

T.gondii has glycosylphosphoinositol lipid moieties material present on surface of its tachyzoite have been discovered as parasite ligands for TLR2 and 4, and TLR11 recognizes profilin in the parasite cytoplasm, likely after phagocytosis of dead or parasites covered in antibodies. Th1 cells that are specifically directed against an antigen cytotoxic T cell CD8+ contribute to immune responses develop after the generation of IL-12 and activation of NK cells. T helper and cytotoxic cells mediate protection throughout both the recent and persistent phases of disease by producing IFN-y. in large concentration , Long-term infection can also be controlled by perforin material where cytolytic T cell activity dependent it , however this seems to be secondary to IFN-y generation. Depending p47 GTPase in intestinal infection with parasite the bacteria present in mucosal member trans signal to immunity for activation interferon by IL-12 [17][18] in another study elevated of interferon [19] Tryptophan, an important amino acid for intracellular parasite growth, is reportedly degraded by IFN-y activated indoleamine(2,3-dioxygenase 1) material (IDO1), which is thought to have a significant role in limiting *T. gondii* growth. While in [20] At day 5, IFN therapy decreased MeWo and also A549 cell counts by (7% - 21%) respectively and The amount of VZV generated by MRC-5 and ARPE-19 cells was consistently greater than that of MeWo and also A549 special cells for this reason decrease level of interferon[21] .

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