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# 9<sup>th</sup> Molecular Immunology & Immunogenetics Congress

March 08-09, 2018 | London, UK



## Mohammad Hossein Feiz Haddad

Infectious and Tropical Diseases Research Center, Health Research Institute, Ahvaz Jundishapur

University of Medical Sciences, Ahvaz, Iran

### Effects of toxoplasmosis on thyroid hormones in diabetic patients

**Background:** Evidence suggests the involvement of autoimmune mechanisms in pathogenesis of diabetes mellitus and thyroid gland dysfunction. The role of *Toxoplasma gondii* in diabetes and autoimmune diseases has been separately discussed. In this regard, the present study aimed to evaluate the effects of Toxoplasmosis on thyroid hormones in diabetic patients.

**Material & Methods:** In this cross-sectional and descriptive study 582 patients, referred to Endocrine and Diabetes Clinics, were enrolled in the study by an endocrinologist. Thyroperoxidase antibodies (TPOAb), Serum thyroid stimulating hormone (TSH), and free thyroxine (FT4 & FT3) were assessed to detect *Toxoplasma* status by the anti-*Toxoplasma* IgG and IgM enzyme-linked immunosorbent assay (ELISA). The collected data were analyzed using SPSS version 20.

**Results:** Generally, 21.7% of the subjects were positive for *Toxoplasma* infection and 15.3% were indicated for TPOAb. Subjects with *toxoplasma* infection showed a higher TPOAb than negative subjects (p=0.005), and there was a positive association between the index of anti-*Toxoplasma* IgG antibodies (p=0.033) and FT4, FT3, and it was seen even more stronger in TPOAb-positive *Toxoplasma*-positive subjects, (p=0.014). Totally, anti-*Toxoplasma gondii* IgG immunoglobulin showed the highest mean in subjects. The mean and standard deviation of anti-*Toxoplasma gondii* IgG and IgM in diabetic patients with and without thyroid dysfunction showed a significant difference (p<0.05). Furthermore, the proportion of patients with acute and chronic *Toxoplasma gondii* infection was significantly different in diabetic patients with and without thyroid disorders (p=0.005). The highest correlation was observed between *anti- Toxoplasma gondii* IgG and IgM antibodies and TPOAb and TSH test.

**Conclusion:** The results thus indicated that toxoplasmosis as such might have a stimulatory compact on thyroid gland hormone production in diabetic patients. We presume that an initial shift of Th1 to Th2 immune reactions arises in diabetic subjects which may initiate a recrudescence for *Toxoplasma* infection, because under regular circumstances, *Toxoplasma* infection is mostly controlled through Th1 immune cells. The parasite in this alteration could probably have a limited capability to escape from immune responses and subsequently there is autoimmune mechanisms activation to progress the release of thyroid hormones. Meanwhile, the role of NK cells should be considered in the interaction between thyroid autoimmunity and *Toxoplasma* infection due to their capacity in parasite replication restraint and parasite clearance by a robust IFN-c-mediated effect. Therefore, the NK cell deficiency in autoimmune thyroiditis could led to a higher risk of recrudescence of *T. gondii* infection in diabetic patients. The results of this study showed that *Toxoplasma* was associated with the increase of thyroid hormones and enhance the risk of thyroid problems in diabetes subjects; so, screening tests are recommended for detecting of toxoplasmosis in diabetic patients with thyroid disorders to provide new indications for preventive measures in the triad pathogenesis complex.

#### Biography

Mohammad Hossien Feiz Hadad completed his PhD from Bradford University, England in Pharmaco-parasitology on biopharmaceutical and standard drugs for their mechanisms of action on blood and intestinal parasites. He completed his postdoctoral studies at Nottingham Trent University, England on Leishmania vaccine focus on peptide sub-unit, DNA vaccines, centrin genes and immuno-modifier molecules OX40L: TNF super family member expressing on activated dendritic cells and involved in T cell activation. He is Supervising Msc and PhD projects in Ahvaz Jundishapur University of Medical Sciences, Iran, on evaluation of anti-protozoal drug combinations, drug resistance and Protozoal ultra-structure studies. His recent research activities focused in water-borne parasites and Water treatment technologies to remove effectively parasitic elements.

hfeizhaddad@yahoo.com

Immunome Research ISSN: 1745-7580