Possible Role of Toxoplasmosis on Gene Sequence Alteration in Patients with Cardiovascular Diseases

Nazar Sh. Mohammed[1], Ammer Abd. Mohammed[2], Salwa S. Muhsin[1]

[1]Department of Medical Laboratory Techniques/ College of health and Medical/ Medical Technical University/ Baghdad/ Iraq (MTU), [2]Department of Community / Medical-Technical Institute/ Baghdad, Middle Technical University /Iraq (MTU)

Abstract

Toxoplasmosis is one of the risky infection my lead to cardiovascular diseases. One hundred therein patients samples were collected with Heart Diseases and there were infected with Toxoplasmosis, in Baghdad educational Hospital from period 1st January 2019 to 1st September 2019. The results show that prevalence of *Toxoplasma gondii* among Hypertensive disease and Myocardiopathy with Heart Diseases. The genotype of *MYLK3* exon to Human cardiac gene by gel electrophoresis, Lane M markers correspond to 500 bp ladder lane 2 of gene band with 600bp. Mutation occurrence in exon 8 the gene sequence CCCAGCCGG were change to CCCATCCGG, and in exon 9 the change occurrence in sequence CTCAAGCCGGAG to CTCAAGGTACAA.

Keywords: *Toxoplasma gondii, Alteration, gene sequence, cardiovascular diseases.*

Introduction

Toxoplasmosis is generally a mild infection with signs of lymphadenopathy, but some patients may develop chorioretinitis whic can progress into blindness(1). Severe neurological disorders may be shown by those immunocompromised patients who are infected with *Toxoplasma gondii* (2). Congenital disorders of newborns may also result from primary toxoplasmosis during pregnancy (3). In humans, heart may be affected by toxoplasmosis (4). with myocarditis (3), myocarditis with pericarditis (21, 22) as well as the acute heart failures (5). Patients with toxoplasmosis who develop myocarditis may present with congestive heart failure, arrhythmias, pericardial effusion and constrictive pericarditis (5). There are few studies on the sero-epidemiology of patients suffering from heart diseases due to toxoplasmosis (6). Our study aimed to determine the association between exposure to *Toxoplasma gondii* and patients with cardiac diseases who attended to Baghdad teaching hospital/ Medical city and the association between seropositive patients and behavioral, demographic as well as the clinical features of patients.

Materials and Method

One hundred therein patients samples were collected with Heart Diseases and there were infected with Toxoplasmosis, in Baghdad educational Hospital from period 1st sJanuary 2019 to 1st September 2019, all these patients were diagnosed with Toxoplasmosis by ELISA, Anti *Toxoplasma* antibodies IgM and IgG. Genetic test were done by conventional PCR Primers used for amplifying *MYLK3* exons

AGCTGGGCGCCTCCTCTTT

CCTGGCATCAGACTGCACC

GTGCCGGGAGACCTGGGTTTGA

CCTGCCCCGTGACTCCTGCTCTAA

Statistical analyzing

Preceded data has been entered to the computer with the use of “Statistical Package of Social Science” Software program, v. 18 (SPSS).

Results

The association between *toxoplasmosis* seroprevalence and the clinical features of patients with cardiac diseases:

Table (1): The prevalence of *Toxoplasma gondii* among Hypertensive disease and Myocardiopathy with Heart Diseases.

Table (1): The association between *toxoplasmosis* seroprevalence and the clinical features of patients with cardiac diseases

Features	Patients' number	Prevalence of toxoplasmosis	
		Number	%
Hypertension			
yes	25	3	12.0
No	15	2	13.3
No	24	9	37.5
Myocardiopathy			
Yes	9	2	22.2
No	38	5	13.1

Mutation occurrence in exon 8 the gene sequence CCCAGCCGG were change to CCCATCCGG, and in exon 9 the change occurrence in sequence CTCAAGCCGGAG to CTCAAGGTACAA of *MYLK3* gene shows in table 2.

To detection the genotype of *MYLK3* exon to Human cardiac gene by gel electrophoresis, Lane M markers correspond to 500 bp ladder lane 2 of gene band with 600bp. Seen in figure 1.

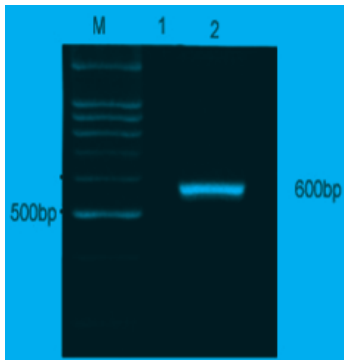

Figure 1: Detection the DNA of (MYLK3 gene) genes Lane M markers correspond to 500 bp ladder (fermintus), lanes 1 & 2and 3 the k13 gene bands with 849 bp.

Table (2) 2 Mutation occurrence in exon 8and exon 9.

Reference	CCCAGCCGG	Variant (c.1915-1G>T) in Exon 8	CCCATCCGG
Reference	CTCAAGCCGGAG	Variant (Exom 9)	CTCAAGGTACAA

Discussion

Toxoplasmosis is one of the risky infection my lead to cardiovascular diseases. Cardiovascular diseases are common conditions in adults that may be in the heart muscles or vessels. *Toxoplasma gondii* due to its presence within the cellular tissue may affect the heart [(1)]. 12% of people with Hypertensive disease are infected with Toxoplasmosis and they are mainly cardiovascular disease. These finding matched with (Flegr, J. *et al*, 2014) who found that 24% of cardiovascular diseases complaining hypertension and they have toxoplasmosis [(7)]. 22.2% of myocardiopathy patients suffer from cardiovascular patients, also they have toxoplasmosis. This report agreed with (England, J. H. *et al*, 2019), who reported that 26% with cardiovascular disease and they complaining myocardiopathy with Toxoplasmosis [(8)]. Cardiovascular disorders are heart conditions, this

phenomenon may be a known source or there or may be a pathogen that causes of these exacerbations or at least be involved in the exacerbation of the condition. Mutation occurrence in exon 8 the gene sequence CCCAGCCGG were change to CCCATCCGG, and in exon 9 the change occurrence in sequence CTCAAGCCGGAG to CTCAAGGTACAA, of *MYLK3* gene, and whole exon sequencing in combination with the segregation analysis of each pedigree with the familial DCM, and determined the read-through mutation i.e (c.2459 A>C; p.*820Sext*19) in the light chain kinase 3 gene (*MYLK3*) of myosin in patients with cardiomyopathy disorders (Tobita, T. et al, 2017), [9]. Cardiomyopathy is the disease of the cardiac muscles. This disease has many clinical features, causes as well as treatments. In most cases, cardiomyopathy causes enlargement, rigidity and thickness of the cardiac muscle. In rare conditions, the ill tissue of the cardiac muscle is replaced with scar tissues. When cardiomyopathy worsens, then the heart becomes weaker. Pumping of blood by the heart becomes less throughout the body and maintaining normal electrical rhythm also becomes less than usual, and it may lead to heart failure or irregular heartbeats known as arrhythmias. Heart valve disorders may also result from the weakened heart [9]. The tropical pulmonary eosinophilias, which have a characteristic of restrictive lung disease and progressive interstitial fibrosis, can lead to PH and then to a course of filarial infection. Intracardiac rupture of *Echinococcus* cyst and *Toxoplasma gondii* may lead to the membrane or secondary cyst embolization of the organs or lungs that are supplied by the systemic circulation. cardiac involvement by parasites must be considered in the differential diagnosis, despite unusual reasons of heart diseases outside the endemic areas, especially in myocardial or pericardial patients of unknown causes. In this study, the present knowledge on the main cardiac diseases caused by the protozoan and metazoan parasites have been updated and summerized, including the heart muscle either directly adversely, (Nunes, M. C. P *et al,* 2007), [10]. The genetic mutation of cardiovascular disease patients associated with toxoplasmosis has been found to exacerbate the pathological condition and alter the gene trajectory of the infected. These findings were in harmony with (Webster, J. P. *et al,* 2013) who reported the behavioral alterations seen in the infected hosts indicate the following: (1) The active manipulation of the parasite's selective benefit; (2) the active manipulation of the host's selective benefit to improve the effects of the infection; (3) The general pathological response of the host of no clear parasite's or host's selective benefit; or, finally, the subtle distinction of the latter grouping known here as (4) the 'by-product pathology' as a result of the accidental toxoplasmosis selected for behavior manipulation in the alternative host species or the stage of the life cycle. In addition, as this perspective study evaluates the applicability of studying *Toxoplasma gondii* in rats (and/or mice), the intermediate hosts as models to help us understand both evolutions and mechanisms that underpin parasite-changed behaviors (ranging from rodent›s predation to some conditions of human schizophrenia), for the first time in this review we have introduced the novel term of '*T. gondii*–rat manipulation–schizophrenia model' [11]. The genetic mutations that occurred in exon 8 and exon 9 on the *MYLK3* gene proved that there was a genetic sequence change in this muscle tissue of the heart due to the involvement of *Toxoplasma gondii* in the exacerbation of the disease. These work agreed with (Ngô, H. M. *et al.*2017) who reported that these data were de convoluted using three biology system topics: "Orbital deconvolution" elucidated upstream, regulatory pathway interconnecting human susceptibile genes, biomarkers, proteomes in addition to transcriptomes. "Cluster deconvolution" showed visual protein-protein interactions included in a process that affects brain function and circuitry, such as leukocyte migration, lipid metabolism and olfaction. Eventually, "disease deconvolution" which identifies correlations between epilepsy and parasite-brain interactions, movement disorders, Alzheimer's as well as cancer. This "reconstruction-deconvolution" provides templates of the progenitor cells' potentiating influences and components affecting human brain parasitism and disorders [12]. Little research has been done on the incidence of people suffering from heart disease may be involved in *Toxoplasma* or may be conducive to these injuries and therefore has been proven that there is a direct relationship with *Toxoplasma* infection and cases of heart disease and this report works for the first time in Iraq.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

Conflict of Interest: The authors declare that they have no conflict of interest.

Funding: Self-funding

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