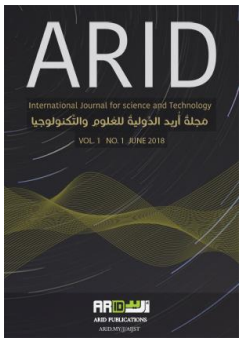
ARID Journals

ARID International Journal for Science and Technology (AIJST)
ISSN: 2662-009X

VOL. 1 NO. 1 JUNE 2018

Journal home page: http://arid.my/j/aijst



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SEROLOGICAL COMPARISON STUDY FOR DIAGNOSIS OF TORCH PROFILE AGENTS OF PREGNANT WOMEN IN IRAQ

*Anmar Ahmed ALTaie [1] Basima A. Abdullah[1] and Mozahim Y. Al-Attar[2]

[1] *Dept. of Biology, College of Science, University of Mosul, Iraq** .
[2] *Dept. of Microbiology, College of Veterinary Medicine, University of Mosul, Iraq.*

دراسة مصلية مقارنة لتشخيص إصابات الـ TORCH للنساء الحوامل في العراق

*أنمار أحمد الطائي [(1)] ، باسمة أحمد عبدالله [(1)] ، مزاحم ياسين العطار[(2)]

[1]قسم علوم الحياة ، كلية العلوم ، جامعة الموصل ، الموصل ، العراق .
[2]قسم الأحياء المجهرية ، كلية الطب البيطري ، جامعة الموصل ، الموصل ، العراق .

anmaraltaee1978@yahoo.com

ARTICLE INFO
Article history:
Received 15/04/2018
Received in revised form 02/05/2018
Accepted 30/05/2018
Available online 15/06/2018

ABSTRACT

This study reports the prevalence of *Toxoplasma gondii* (*T.gondii*), *Rubella virus*, *Cytomegalovirus* (CMV), and *Herpes simplex virus* (HSV), infections in 1500 serum samples from women with Bad Obstetric History (BOH) like abortion and dead fetuses from Mosul and Baghdad hospitals. These Samples taken as serum, to used it in ELISA (IgM ,IgG) , EUROLINE immunoblot (IgM, IgG) and the indirect immunofluorescence test for BIOCHIPs TORCH-Profile IgG to detect the presence of the TORCH agents, for two years. Three hundred positive samples demonstrating the presence of immunoglobulin IgM and IgG antibodies using ELISA test. IgM antibodies were positive in 44 patients (14.7%) *T.gondii*, 146 (48.7%) CMV, 37 (12.3%) Rubella, and 177 (59%) HSV II and IgG antibodies were positive in 75 patients (25%) *T.gondii*, 189 (63%) for CMV, 60 (20%) Rubella, and 232 (77.3%) HSV II.

We were selected 30 samples from the 300 which had been shown the presence of IgM antibodies in ELISA kits, to used it in EUROLINE immunoblot. IgM antibodies were positive in 2 patients (6.7%) for CMV, Rubella & HSV I and Nil for *T.gondii* and HSV II. IgG antibodies were positive in 4 patients (13.3%) for *T.gondii*, 29 (96.7%) CMV and HSV I, 28 (93.3%) Rubella, 2 (6.7%) HSV II. Also 45 samples were selected from the 300 samples were used in the indirect immunofluorescence test for BIOCHIPs TORCH-Profile IgG positive in 21 patients (46.7%) *T.gondii*, 45 (100 %) CMV, 31(68.9%) Rubella and 44 (97.8%) HSV I and II.

Keywords: TORCH Infections, ELISA for TORCH , Immunoblot for TORCH , Indirect immunofluorescence test for TORCH .

الخلاصة

إن العدوى التي تسببها إصابات الـ TORCH المقوسات الغوندية *T.gondii* ، فايروس الحصبة الألمانية Rubella ، الفايروس المضخم للخلايا CMV وفايروس العقبولة HSV ، في النساء الحوامل المعرضات لخطر العدوى، أو الأجنة، أو لديهم تشوهات خلقية. عادة ما تكون إصابات الـ TORCH قليلة الضرر في الأم ، ولكن يمكن أن تكون ذات تاثير قوي، أو مميتة في الجنين. درجة الخطورة تعتمد على مدة الحمل . ويمكن عند الإصابة لضراوة الإصابة أن تؤثر في الجنين أثناء فترة النمو، وتزيد من شدة الإصابة للأمهات. تشير الدراسة إلى انتشار إصابات المقوسات الغوندية *T.Gondii*، فايروس الحصبة الألمانية Rubella ، الفايروس المضخم للخلايا CMV وفايروس العقبولة HSV في 1500 عينة مصلية من النساء اللواتي لديهن تاريخ ولادات مضطرب كالإجهاض والأجنة الميتة ، المراجِعات لمستشفيات مدينتي الموصل وبغداد، . تم أخذ هذه العينات كمصل لاستخدامها في تقنية المقايسة الامتصاصية المناعية للإنزيم المرتبط (ELISA) للكوبيولينات المناعية نوع IgG,IgM ، وتقنية اللطخة المناعية (immunoblot) للكوبيولينات المناعية نوع IgG,IgM ، واختبار التألق المناعي غير المباشر (Indirect Immunofluorescence) للكلوبيولين المناعي غير المباشر IgG للكشف عن إصابات الـ TORCH ولمدة عامين.

أظهرت النتائج أن ثلاثمائة عينة موجبة لتواجد الأجسام المضادة للكلوبيولين المناعي IgM و IgG باستخدام اختبار تقنية المقايسة الامتصاصية المناعية للانزيم المرتبط (ELISA). كانت الأجسام المضادة IgM إيجابية في 44 مريضا وبنسبة (14.7٪) للـمقوسات الغوندية *T. gondii*،146(48.7%) للفايروس المضخم للخلايا CMV ، 37(12.3%) لفايروس الحصبة الألمانية Rubella و177(59%) لفايروس العقبولة النوع الثاني HSV II ، اما الأجسام المضادة IgG فكانت إيجابية في 75 مريضا بنسبة (25%) في الـمقوسات الغوندية *T. gondii*، 189(63%) للفايروس المضخم للخلايا CMV ، 60 (20%) لفايروس الحصبة الألمانية Rubella و 232 (77.3%) لفايروس العقبولة النوع الثاني HSV II . انتخب ثلاثون عينة إيجابية من العينات الـ 300 التي أثبتت تواجد الأجسام المضادة للكلوبيولين المناعي نوع IgM في تقنية المقايسة الامتصاصية المناعية للانزيم المرتبط (ELISA) ، لاستخدامها في تقنية اللطخة المناعية (immunoblot) للكوبيولينات المناعية نوعي IgG,IgM على التوالي . حيث تواجدت الأجسام المضادة للـ IgM في مريضين (6.7%) في الفايروس المضخم للخلايا CMV ، الحصبة الألمانية Rubella و فايروس العقبولة النوع الاول HSV I ولم يتواجد في الـمقوسات الغوندية *T. gondii*وفايروس العقبولة النوع الثاني HSV II . الأجسام المضادة للـ IgG تواجدت في 4 مرضى (13.3%) في الـمقوسات الغوندية *T. gondii* ، 29 (96.7%) في الفايروس المضخم للخلايا CMV و فايروس العقبولة النوع الاول HSV I ، 28 (93.3%) الحصبة الألمانية Rubella ، 2 (6.7%) لفايروس العقبولة النوع الثاني HSV II . كما تم انتخاب خمس وأربعين عينة إيجابية من العينات الـ

300 والتي أثبتت تواجد الأجسام المضادة للكلوبيولين المناعي نوع IgG في تقنية التألق المناعي غير المباشر Indirect Immunofluorescence للكلوبيولين IgG (الرقاقة الحيوية) في 21 مريضا (46.7%) للـمقوسات الغوندية *T. gondii* ، 45 (100%) في الفايروس المضخم للخلايا CMV ، 31 (68.9%) للحصبة الألمانية Rubella و فايروس العقبولة النوع الأول والثاني كانت 44 (97.8%) .إن دراسة إصابات الـ TORCH في النساء الحوامل اللواتي لديهن تاريخ ولادات مضطرب كالإجهاض والأجنة الميتة باستخدام الطرق المصلية لتحديد خطر الكائنات الممرضة في الـ TORCH (الـمقوسات الغوندية *T. gondii*، فايروس الحصبة الألمانية Rubella، الفايروس المضخم للخلايا CMV و فايروس العقبولة النوع الأول والثاني HSV I&II) .

الكلمات المفتاحية: إصابات **الـ** TORCH ، تقنية المقايسة الامتصاصية المناعية للانزيم المرتبط (ELISA) للـ TORCH ، تقنية اللطخة المناعية (Immunoblot) للـ TORCH ، اختبار التألق المناعي غير المباشر (Indirect Immunofluorescence) للـ TORCH.

1- INTRODUCTION

Infections known to produce congenital defects have been described with the acronym TORCH (***T****.gondii*, **O**thers, **R**ubella, **C**ytomegalovirus **H**erpes). The "others" category has rapidly expanded to include several viruses known to cause neonatal disease. Traditionally, only viral infections of concern during pregnancy were those caused by Rubella virus, CMV, and Herpes simplex virus (HSV). Other viruses now known to cause congenital infections include parvovirus B19 (B19V), Varicella-Zoster virus (VZV), West Nile virus, Measles virus, Enteroviruses, Adenovirus, Human Immunodeficiency Virus (HIV), and Zika Virus [1].

Perinatal outcomes from viral infections during pregnancy can range from no effect to pregnancy loss by spontaneous abortion to fetal infection with resulting congenital viral syndromes. Prenatal care currently holds no true standard for antenatal management of viral infections during pregnancy, aside from those as TORCH agents, and while these guidelines allow for a diagnosis of infection, no treatment or preventative strategy is available to prevent adverse pregnancy outcomes [2]. The antibodies produced immediately after invasion of a foreign substance can inform on primary infection, reinfection or a reactivation state. Therefore, measuring the level of Immunoglobulins is a widely considered approach for the diagnosis of viral infections [3].

Automated immunoassay-based methods are among the most frequently used for testing and are effective because of the high specificity and binding affinity between antigen and antibody. Therefore, the principle of the test relies in the formation of an immuno-complex between antibody present in the patient sample and synthetic antigen present in the reagent or vice versa, to generate a measurable signal [4]. ELISA provides highly reproducible, quantitative data that makes it an advantageous biotechnological tool in scientific research and clinical diagnosis [5].

Western blotting or immunoblotting refers to the separation of proteins by polyacrylamide gel electrophoresis (PAGE) based on size, their subsequent transfer and immobilization to a membrane support, and their selective detection using an antibody-mediated reporter system, This technique is routinely used to qualitatively identify a specific protein from a complex biological sample and provide information about, molecular weight [6].Immunofluorescent test for recognition the Fc fragment of antibodies in patient sera. Known antigen was added to the test serum of unknown antibody content. Binding of the fluorescent- tagged antibodies are visualized through fluorescence microscopy. Fluorescing aggregates or cells indicate that the Fabs have complexed with the microbe- specific antibodies in the test serum [7].

The aim of this study was to evaluate the incidence of TORCH agents by serological comparison ELISA, EUROLINE Immunoblot test and indirect immunofluorescence test for BIOCHIPs, in pregnant women at risk of threats or have embryos suffer from congenital defect in Iraq.

2- Methodology

Three hundred positive serum samples for TORCH out of 1500 samples from pregnant women were collected from Mosul and Baghdad hospitals for two year. Three hospitals in Mosul City: AL-Salam Teaching Hospital, Al Khansaa Teaching Hospital for Maternity & Children and Al- Batool Hospital for Gynaecology & Obstetrics and Three hospitals in Baghdad City: Al Alwaiya Maternity Teaching Hospital, Al-Kademia Hospital for Children, AlYarmuk Teaching Hospital.These Samples were taken as serum, used in ELISA (IgM,IgG), EUROLINE immunoblot (IgM, IgG) and the indirect immunofluorescence test for BIOCHIPs TORCH-Profile IgG to detect the presence of the TORCH agents.

Enzyme Immunoassay IgM, IgG for TORCH (Toxoplasma gondii, Rubella, CMV, HSV)

Purified TORCH antigen is coated on the surface of microwells according to manufacturer procedure from BioCheck,Inc , Germany. Diluted patients' serum were added to the wells, Horseradish Peroxidase Enzyme conjugate (HRP-conjugate) is added, which binds to the antibody-antigen complex. Excess HRP-conjugate is washed off and a solution of 3,3',5,5'-Tetramethylbenzidine (TMB) Reagent is added. The enzyme conjugate catalytic reaction is stopped at a specific time for 10 Sec. The intensity of the color enerated is proportional to the amount of IgM or IgG -specific antibodies in the samples. The results were observed by a microwell reader compared in a parallel manner with calibrator and controls.

Antibodies against TORCH antigens (IgM or IgG) using TORCH Profile EUROLINE

The EUROLINE test Kit according to manufacturer procedure from EUROIMMUN, Germany, provides a qualitative *in-vitro*-assay for human antibodies of the IgM or IgG class to five different TORCH antigens. In the first reaction step, diluted patient samples were incubated with the immunoblot strips. In the case of positive samples, the specific IgM or IgG antibodies (also IgA) will bind to the corresponding antigenic site. To detect the bound antibodies, a second incubation was carried out using an enzyme-labelled antihuman IgM or IgG (enzyme conjugate) catalyzing a colour reaction depending manufactures instructions.

Detection of TORCH IgG antibody using indirect immunofluorescence test (EUROIMMUN BIOCHIP Mosaic)

This test kit according to manufacturer procedure from EUROIMMUN, Germany was designed exclusively for *in vitro* determination of human antibodies in serum or plasma. The determination can be performed qualitatively or quantitatively. Combinations of different substrates are incubated with diluted patient samples. If the reaction is positive, Specific antibodies

of classes IgA, IgG and IgM attached and were stained with fluorescein-labelled anti-human antibodies and made visible with a fluorescent microscopy.

The **TITERPLANE Technique** was developed by EUROIMMUN to standardize immunological analyses according to manufacturer procedure from EUROIMMUN, Germany for **(EUROIMMUN BIOCHIP Mosaic)**.

3- Results

The current study showed out of 300 serum samples of BOH at ages groups (Under 20, 20-29, 30-39 and Above 39) years in ELISA compared with TORCH Profile EUROLINE (Immunoblot) and indirect immunofluorescence test (EUROIMMUN Biochip) in the same age groups and the rate of infections for ELISA IgM and IgG were (59%,77.3%) for HSV, (48.7%,63%) for CMV, (14.7%,25%) for *T.gondii* and (12.3%,20%) for Rubella respectively. The rate of infections for TORCH Profile IgM and IgG EUROLINE were (6.7%,95.7%) for HSV I, (zero %,6.7%) HSV II, (6.7%,96.7%) CMV, (zero%, 13.3%) *T.gondii* and (6.7%, 93.3%) for Rubella respectively.

Overall seropositivity for IgM antibodies against *T. gondii*, Rubella, CMV, and HSV for either a single organism or in combination, in the present study, Seropositivity for *T. gondii* was found to be 14.7% (n=44), CMV 48.7% (n=146), Rubella 12.3% (n=37) and 59% (n=177) were seropositive for combined HSV II infections (Table 1). On the whole, highest seropositivity (63%) was seen in the age group of (20–29) years and the mean age was (26±6.1).

Table (1): Prevalence of Mixed Etiology of TORCH Infection IgM According to the age groups (Years) by ELISA.

AGE / Year	No.	ELISA IgM																
		T.gondii				CMV					Rubella			Herpes				
		A^+	B^+	AB^+	O^+	A^+	B^+	AB^+	O^+	O^-	B^+	AB^+	O^+	A^+	B^+	AB^+	O^+	O^-
Under 20	29			3	3		2		4	5			5	1		5	8	5
20 - 29	189	3	1	9	12	15	16	16	34	5	2	8	17	19	20	18	40	15
30 - 39	69		3	6	2	10	5	7	25			2	3	6	2	9	18	
Above 39	13				2	2								2			4	5
Total	300	3	4	18	19	27	23	23	63	10	2	10	25	28	22	32	70	25
	Sum	44				146					37			177				
	%	14.7				48.7					12.3			59				

While the seropositivity for IgG antibodies against *T. gondii*, Rubella, CMV, and HSV for either a single organism or in combination, Seropositivity for *T. gondii* was found to be 25% (n=75), CMV 63% (n=189), Rubella 20% (n=60) and 77.3% (n=232) were seropositive for combined HSV II infections (Table 2). overall, highest seropositivity (63%) was seen in the age group of (20–29) years and the mean age was (26±6.1).

Table (2): Prevalence of Mixed Etiology of TORCH Infection IgG According to the age groups (Years) by ELISA.

AGE / Year	No.	ELISA IgG																
		T.gondii				CMV					Rubella			Herpes				
		A^+	B^+	AB^+	O^+	A^+	B^+	AB^+	O^+	O^-	B^+	AB^+	O^+	A^+	B^+	AB^+	O^+	O^-
Under 20	29			5	4		2		7	5			8	1		7	10	5
20 - 29	189	5	4	11	15	18	21	19	42	7	6	12	19	23	29	24	52	15
30 - 39	69		5	11	9	13	7	13	33			8	7	11	7	12	23	
Above 39	13				6	2								2			6	5
Total	300	5	9	27	34	33	30	32	82	12	6	20	34	37	36	43	91	25
	Sum	75				189					60			232				
	%	25				63					20			77.3				

While the antibodies against TORCH antigens (IgM or IgG) test instructions for TORCH Profile EUROLINE evaluation of incubated test strips, we were generally recommend using the EUROLineScan software. After we stopped the reaction using deionized, we were placed the incubated test strips onto the adhesive foil of the green work protocol using a pair of tweezers. The position of the test strips can be corrected while they were wet. As soon as all test strips had been placed onto the protocol, they should be pressed hard using filter paper and left to air-dry. After were dried, the test strips were stuck to the adhesive foil. The dry test strips are then scanned using a flatbed scanner (EUROIMMUN AG) or (any Scanner read it) and evaluated with EUROLineScan. The code for entering the test into EUROLineScan was, T.O.R.C.H.IgM. or

T.O.R.C.H.IgG. There was a control band on the strips. The incubation was performed correctly if a strong color reaction was visible on this control band.

The seropositivity for IgM antibodies in TORCH profile EUROLINE against *T. gondii*, Rubella, CMV, and HSV for either a single organism or in combination, seropositivity negative for *T. gondii* and HSV II, CMV, Rubella and HSV I 6.7% (n=2) Table 3. While overall seropositivity (6.7%) was seen in the age group of (under 20, 20 –29 & 30-39) years and the mean age was (26±5.9).

Table (3): TORCH profile IgM EUROLINE According to the age groups (Years)

AGE / Year	No.	TORCH Profile EUROLINE IgM				
		T.gondii	CMV	Rubella	Herpes	
					HSV I	HSV II
			AB^+	AB^+	O^-	
Under 20	2				2	
20 - 29	18		2			
30 - 39	10			2		
Above 39						
Total	30	zero	2	2	2	zero
	%	zero	6.7	6.7	6.7	zero

Table 4 Explains the seropositivity for IgG antibodies in TORCH profile EUROLINE against *T. gondii*, Rubella, CMV, and HSV for either a single organism or in combination, Seropositivity for *T. gondii* was found to be 13.3% (n=4), CMV & HSV I 96.7% (n=29), Rubella 93.3% (n=28) and 6.7% (n=2) were seropositive for combined HSV II infections. overall, highest seropositivity (63.3%) was seen in the age group of 20–29 years and the mean age was (26±5.4).

Table (4): TORCH profile IgG EUROLINE According to the age groups (Years)

AGE / Year	No.	TORCH Profile EUROLINE IgG																				
		T.gondii			CMV					Rubella					Herpes							
															HSV I					HSV II	
		A^+	AB^+	O^+	A^+	B^+	AB^+	O^+	O^-	A^+	B^+	AB^+	O^+	O^-	A^+	B^+	AB^+	O^+	O^-	AB^+	O^+
Under 20	3							2	1				2	1				2	1		
20 - 29	19	1	2	1	2	1	7	12		2	1	7	11		2	1	7	12		1	1
30 - 39	8				2		1	1		2		1	1		2		1	1			
Above 39	zero																				
Total	30	1	2	1	4	1	8	15	1	4	1	8	14	1	4	1	8	15	1	1	1
	Sum	4			29					28					29					2	
	%	13.3			96.7					93.3					96.7					6.7	

(Table 5) Explain the seropositivity for IgG of the indirect immunofluorescence test antibodies in TORCH profile EUROLINE for either a single organism or in combination, Seropositivity for *T. gondii* was found to be 46.7% (n=21), CMV 100% (n=45), Rubella 68.9% (n=31) and 97.8% (n=44) were seropositive for combined HSV II infections (Table 5). On the whole, highest seropositivity (62.2%) was seen in the age group of 20–29 years and the mean age was (23±5.6).

All results of TORCH-Profile Instructions for the indirect immunofluorescent test BIOCHIP Mosaic Test were show in figure 9.

Table (5): TORCH Profile IgG Of the Indirect Immunofluorescence test According to the age groups (Years) According to age (Years)

AGE / Year	No.	the indirect immunofluorescence test IgG																			
		T.gondii				CMV					Rubella					Herpes					
		A^+	B^+	AB^+	O^+	A^+	B^+	AB^+	O^+	O^-	A^+	B^+	AB^+	O^+	O^-	A^+	B^+	AB^+	O^+	O^-
Under 20	4				2				3	1				2	1				3	1
20 - 29	28	3	1	2	8	5	3	5	14	1	3	1	4	10	1	5	2	5	14	1
30 - 39	11	2		1	2	3	1	3	4		3	1	3	2		3	1	3	4	
Above 39	2								1	1									1	1
Total	45	5	1	3	12	8	4	8	22	3	6	2	7	14	2	8	3	8	22	3
	Sum	21				45					31					44				
	%	46.7				100					68.9					97.8				

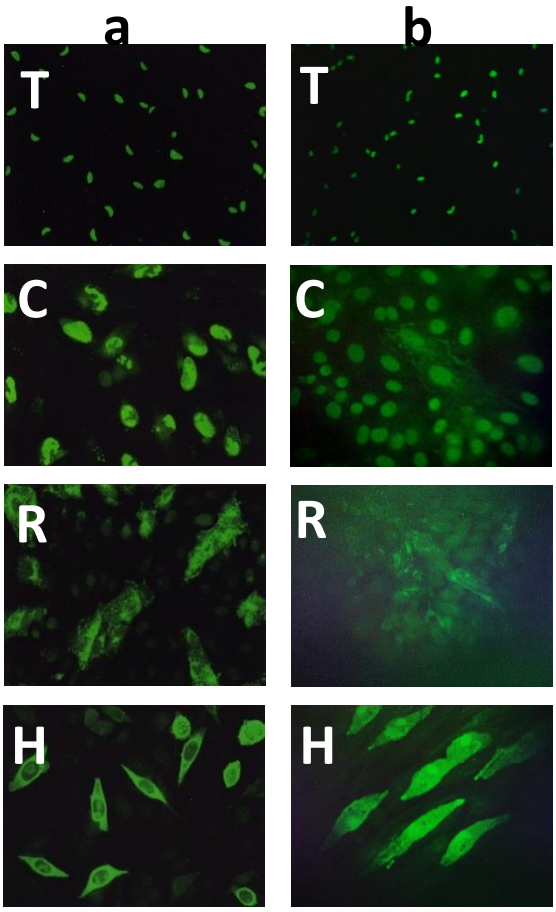

Figure (9): TORCH-Profile Instructions for the indirect immunofluorescent test (BIOCHIP Mosaic Test). a: Positive Control b: TORCH Infection (T= *T. gondii*, C= CMV, R= Rubella, H= HSV I&II)

4- Discussions

The current study showed out of 300 serum samples of BOH at ages groups (Under 20, 20-29, 30-39 and Above 39) years in ELISA compared with TORCH Profile EUROLINE (Immunoblot) and indirect immunofluorescence test (EUROIMMUN BIOCHIP Mosaic Test).

In the present study, seroprevalence of TORCH IgM& IgG infections in pregnant women at BOH from congenital defect were found to be high percentage was CMV & HSV which contrasting with the seroprevalence reported by Kumari and other 2018 [8]. which show high percentage in *T.gondii* & Rubella. However, Sadik and other 2012 [9] reported conformed high

prevalence of IgM in CMV & HSV and contrasted in IgG, and the study contrasted that the high percentage infection present in O^+ blood group that which contrasted Franchini and other 2016 [10] indicated that the ABO blood type not only plays a role in transfusion and transplantation medicine, but is implicated in the pathogenesis of a kaleidoscope of human disorders, The results of this systematic review support for the first time the existence of a consistent influence of ABO status on the risk of developing preeclampsia. Specifically, women with a non-O blood type were found to have a moderately increased risk of this condition compared with the risk in those with O blood type. The systematic analysis of the literature data also suggests that non-O pregnant women have an increased incidence of Venous ThromboEmbolism (VTE) compared with that in pregnant women with O blood type. Less evidence is available for the association with other adverse pregnancy outcomes, reflecting the paucity of published clinical data. Thus, further prospective studies including large populations of patients are warranted to assess the role of ABO blood group in identifying women at risk of developing pre-eclampsia or other pregnancy-related complications. Experimental investigations are also needed to unravel the underlying pathogenic mechanisms of these interactions [8,9,10].

Seroprevalence of TORCH infections was more common in (21–30) years age group analogous with a study of many research probably because this is the most common childbearing age group and that which confirm by Poudyal and other 2018 [11] which they reported that the age of women ranged from (21-30) were (57.7%) that the sane in our study, more that the percentage of their in CMV and HSV of both IgM & IgG is the same higher results compare with *T.gondii* and Rubella under study [11,12].

Infection with one of the TORCH pathogens contracted during pregnancy may be passed through placenta to the fetus affecting the fetus and newborn potentially causing serious birth defects. Asymptomatic infants may develop abnormalities later in life, The infections caused by TORCH organisms are grouped together because they all result in serious birth defects when

transmitted from an infected mother to her foetus during pregnancy [9,13]. Maternal infections play a critical role in pregnancy wastage and their occurrence in patients with BOH or complicated pregnancy is a significant risk factor,These infections cause fetal and neonatal mortality and an important contributor to early and later childhood morbidity [13]. Previous history of pregnancy wastage and the serological reactions for TORCH infections during current pregnancy must be considered while managing BOH cases to reduce the adverse foetal outcome [8,13].

This study was brought to light that the important of serological tests to determined the type of infections if a short-term infection is an acute infection or a long-term infection is a chronic infection. Infections can be further classified by causative agent (bacterial, viral, fungal, parasitic), and by the presence or absence of systemic symptoms [14].

BOH implies previous unfavorable fetal outcome in terms of two or more consecutive spontaneous abortions, history of intrauterine fetal death, intrauterine growth retardation, stillbirth, early neonatal death and /or congenital anomalies. Cause of BOH may be genetic, hormonal, abnormal maternal immune response, and maternal infection. Primary infections caused by TORCH is the major cause of BOH abortion [8,15]. The prevalence of these infections varies from one geographical area to another. These maternal infections are initially unapparent or asymptomatic and thus, were difficult to diagnose on clinical grounds [16].

The conventional single serum assays do not make a clear distinction between a recent primary and chronic infection. The tendency of specific IgM to persist for a long time even at high levels has been verified in several studies. After, introduction in serodiagnosis of Toxoplasma-associated infections, the measurement of IgG avidity has proved to be a highly-useful procedure, especially in combination with conventional serological assays [17,18].

Viral infections in pregnancy are major causes of maternal and fetal morbidity and mortality. Infections can develop in the neonate transplacentally, perinatally (from vaginal

secretions or blood), or post-natally (from breast milk or other sources). The clinical manifestations of neonatal infections vary depending on the viral agent and gestational age at exposure. The risk of infection is usually inversely related to gestational age at acquisition, some resulting in a congenital malformation syndrome [19].

Varies rates of seropositive of TORCH Abs using different serological tests had been reported among different age groups in Iraq and in some of them high rate were reported. This might be due to sample size, method of calculate, residency, age and type of test or other factors.

5- Conclusion:

It was evident that among the TORCH pathogens CMV and HSV to larger extent in compared with Toxoplasma and Rubella virus. All cases of BOH should be routinely screened for TORCH by ELISA test for early diagnosis so that appropriate intervention at early stages can help in proper management of these cases. EUROLINE immunoblot test can be used effectively to determined IgM and IgG in BOH samples. But the indirect immunofluorescence test can be used for IgG determination only.

6-List of Abbreviation

Toxoplasma gondii (*T.gondii*), Cytomegalovirus (CMV) , Herpes simplex virus (HSV) , Bad Obstetric History (BOH) .

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