Study of Immune Status for Rubella, Cytomegalovirus, Hepatitis B Virus, and *Toxoplasma gondii* in Sera of University Students

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Summary

The study was conducted to know the range of spread of Rubella virus, Cytomegalovirus, Hepatitis B virus, and *Toxoplasma gondii* among students at Al-Mustaqbal University College, its impact on society in the province of Babylon. Therefore this study includes the evaluation of the immune status in sera of students to the investigation from *Toxoplasma gondii,* Rubella virus, Cytomegalovirus by IgM/IgG rapid test and Hepatitis B virus by HBV-5 rapid test of 90 specimens that were collected during the period extending from January 2019 to March 2019. Data about individuals have been collected aseptically in sterile containers, after getting all data in the special formula including, name, gender, age. It revealed that Cytomegalovirus formed (CMV) 13.3% followed by Toxoplasma gondii 0% Rubella 0%, depending on IgM. While shows result in IgG seropositivity to Rubella was 60% followed by CMV was 36.7% and Toxoplasma was 10%. The results of the present study showed that all HBs Ag and HBe Ag were negative whereas HBe Ab and HBc Ab were positive, while HBs Ab was only three positive from other samples.

Keyword: *Rubella, Cytomegalovirus, Hepatitis B virus, and Toxoplasma gondii*

Introduction

These are infectious agents that including the Rubella virus, Cytomegalovirus (CMV), Hepatitis B virus (HBV), and *Toxoplasma gondii* are of great importance in the community and their impact on human health. Therefore, it is necessary to know the immune statuses fundamentally for each individual and to take the necessary measures for these agents on time to avoid the transmission of infection and the occurrence of infection [1]. Rubella virus infection is a major public health concern worldwide. Although most cases of rubella infection cause a mild disease which is somewhat similar to measles, during pregnancy, it has a devastating effect on the development of the fetus leading to miscarriage, fetal death, or a birth defect, the actual effect occurs during the first trimester for infection, thus congenital rubella syndrome (CRS). So far, there is no specific treatment for this virus, enter the vaccine when a mutation occurred great quality more than five decades ago, thereby reduced the burden of this disease, which was called a live attenuated rubella vaccine. Rubella remains a common pathogen even in the developing countries that have implemented the vaccine program in the national vaccination schedule. This means that a partial vaccination strategy could lead to a widespread outbreak. Although the single dose of vaccine can induce lifelong protection in most countries that use MMR vaccine, given at 15-18 months, followed by the booster dose before entering primary school, thus rubella control, and CRS depends on the increase in individuals immunity level [2, 3, 4]. Cytomegalovirus

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is endemic in major areas of the world [5]. Human Cytomegalovirus is the DNA herpes family, that presents in the infected nasopharyngeal secretions, saliva, blood, semen, urine, and cervical secretions[6]. Although CMV infections are often asymptomatic, congenital infections are the leading reason for birth defects. In healthy individuals, there are as well some guides that linking sub-clinical reactivations to quickened age-related declines in the immune function and chronic diseases [7]. Major individuals infected suffering from HBV don't experience any symptoms through the acute phase, some people have acute illness with symptoms that last several weeks, and also some of the individuals with acute hepatitis enable develop primary liver failure that can drive into death[8]. Acute HBV is recognized through the found of HBsAg and IgM to core antigen (HBcAg). HBsAg is a principal marker of danger to chronic liver disease and hepatocellular carcinoma (HCC), Some individuals can develop occult HBV, Occult HBV is known as the presence of DNA HBV in liver tissue of HBsAg-negative individuals[9]. *Toxoplasma gondii* occurs in humans mainly by ingestion of oocysts present on unwashed vegetables and raw, or consumption of undercooked and raw meat containing cysts of a parasite. Although T. gondii primary infection is ordinarily asymptomatic in a healthy population, it can be life-threatening for others, like immunocompromised patients. In acute infection or reactivation of a previous infection can drive to severe and possibly lethal diseases (pulmonary, cerebral, or disseminated toxoplasmosis) [10]. **The present study was aimed to** know the range of spread of Rubella virus, Cytomegalovirus, Hepatitis B virus, and Toxoplasma gondii among students at Al-Mustaqbal University College, its impact on society in the province of Babylon, depending on IgM/IgG and HBV-5 rapid test.

Material and Methods

This study was carried out in the Department of Medical Laboratory Techniques at Al-Mustaqbal University College, during the period extended from January 2019 to March 2019.

1. Subjects

A total of 90 random blood specimens, **45 male and 45 female** have collected aseptically in the sterile containers, after getting each data in the special formula including, name, gender, age.

2. Ethical Approval

The agreements of each subjects' intended in this study were obtained before taking the study specimens. Furthermore, the study design was approved by the Research Ethical Committee at Medical Laboratory Techniques/Al-Mustaqbal University College.

3. Sera specimen Preparation and Preservation

After collecting Blood specimens of subjects included in this study using a 5ml sterile syringe for each. Blood specimens were collected in sterile 5 ml capacity sterile plain tubes and labeled. After blood clot formation at a room temperature within 30minutes clotted blood specimens were centrifuged after detaching of clotted boundaries using sterile wooden sticks or pasture pipette avoiding any hemolysis by genteel treatment. The specimens were spinning at 3000 r.p.m. for ten minutes. Separated sera specimens were collected and distributed in 0.5ml quantities in sterile containers, labeled, and stored at -20°C until used.

4. Serological Assay

Rubella virus, Cytomegalovirus, and *Toxoplasma gondii* were detected by Rubella IgG/IgM, CMV IgG/IgM, and Toxo IgG/IgM Combo rapid test cassette, (CTK biotech, Inc. USA). Hepatitis B virus was detected by one step HBV-5 (HBs Ag, HBs Ab, HBe Ag, HBe Ab, and HBc Ab) rapid test cassette, (Gemc technology group Co., Ltd, China). Parameters were measured according to the instruction of the manufacturing company.

Results and Discussion

It revealed that Cytomegalovirus formed (CMV) 13.3% followed by Toxoplasma gondii 0% Rubella 0%, depending on IgM. while shows result in IgG seropositivity to Rubella was 60% followed by CMV was 36.7% and Toxoplasma was 10% according to table 1.

Table (1): The distribution of *Toxoplasma*, CMV, and Rubella according to the positive and negative specimen in population groups

Factor	Toxoplasma		CMV		Rubella		
Specimens No.	90						
Test	IgM	IgG	IgM	IgG	IgM	IgG1	IgG2
Positive	0	9	12	33	0	54	0
Negative	90	81	78	57	90	36	90
%	0	10	13.3	36.7	0	60	0

These results disagreed with other studies, Saudi study revealed Toxoplasma IgG antibodies (Abs) were detected in 35.6%, total IgG Abs for CMV in 92.1%, rubella IgG Abs in 93.3% [11]. Another study confirmed our results IgM seropositivity to Toxoplasma, CMV and Rubella were 42.5%, 29.5%, and 17.5%, respectively.

Rapid test results reveal that there were differences among the five groups, It was observed that all HBs Ag and HBe Ag were negative whereas HBe Ab and HBc Ab were positive, while HBs Ab was only three positive from other samples,

Table (2): The distribution of HBV types according to the positive and negative specimen in population groups

Factor	HBsAg	HBsAb	HBeAg	HBeAb	HBcAb
Specimens No.	90				
Positive	0	3	0	90	90
Negative	90	87	90	0	0

When the immune response that normally clears the infection fails to take place or is too weak to be effective; thus infections are more common in low immunity subjects as a result of poverty [12]. Table (2) indicated that the total HBsAg cases prevalence was zero cases and that result was obtained after testing by rapid test, while HBsAb cases were three only and that indicated the important neediness of a booster dose of the vaccine against HBV. If the specimen is positive of anti-HBe and negative of HBeAg, this mostly means that a virus is passive [13]. Also, the present study results showed are compatible with the study done by Han *et al.,* [14]. who stated that all HBe Ab and HBc Ab positive specimens.

We concluded that immunity to Rubella, CMV, and Toxoplasma was weak immunity while the hepatitis B virus is no immunity, should be advised to vaccinate against hepatitis B virus.

Therefore, we recommended that estimate the incidence of Rubella, Cytomegalovirus, and Toxoplasma infection every 6 months and also the Genotyping study of Rubella, Cytomegalovirus, Toxoplasma, and HBV in Babylon Governorate and determined of strains. in addition to the hepatitis-B vaccine to prophylaxis for risk groups due to the highest risk of exposure to HBV and estimate the incidence of HBV infection every year.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq

Conflict of Interest: None

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