

Clinical and Detection of Immunological Study of Rubella Viral in Iraq Women

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ABSTRACT

The clinical definition of rubella is a three-day maculopapular rash. The diagnosis of rubella rash can be challenging since it can resemble other acute viral diseases. As a result, a clinical diagnosis of rubella infection should not be made exclusively. You need serology. It is best to use IgM or IgG seroconversion to diagnose a recent rubella infection. Rubella IgM antibodies show up soon after the disease starts. Antibodies to rubella IgM may last for six months following the original infection. When a patient without rubella IgG antibodies experiences seroconversion, it suggests a fresh infection. Ten days after the rash first appears, seroconversion takes place. IgG for rubella without IgM suggests a recent infection. IgM for rubella is a sign of infection. Should the infection have happened during the first 16 weeks of pregnancy, the unborn child might have CRS. Samples were gathered in Karma Maternity and Emergency Hospital Anbar, Al-Anbar Province, Iraq, and Salahdin Health Directorate, Northern Technical University. Thirty women who had experienced a single or repeated miscarriage and who were sent by a doctor to undergo a (rubella) test to ascertain the precise cause of their loss were chosen for this study. After being extracted from the blood samples, the patients' serum was kept at -80°C in a deep freezer. The MINI VIDAS test method was used to measure the levels of rubella virus IgG and IgM antibodies in blood samples.

INTRODUCTION

Pregnant women may be more susceptible to infection because pregnancy causes a temporary immunological suppression. A number of viral infections that occur during pregnancy and result in abortion are linked to serious maternal and fetal consequences (Salman, 2015). The woman's body experiences a number of changes at this time, including adjustments to her immunological and water systems. The immune system makes complications more likely. The first level of care should include minor sanctions for prenatal care. More significant operations that can be performed at both levels are required for pregnant women who have any kind of issues. The kind of help is determined by the many issues and the network of donors who will provide it (Galli et al. 2015). As a result, the general public still has to make some efforts to develop alternative medicine methods that impact expectant mothers and look for a comprehensive and workable approach that enables a variety of management with the right diagnosis. Pregnancy-related rubella infections can result in stillbirth, congenital rubella infection, or pregnancy. Particularly in the first trimester of pregnancy, congenital rubella infections can result in miscarriage, stillbirth, and abortion in addition to the dangerous condition known as congenital rubella syndrome (CRS) (WHO, 2011).

After being exposed to a person who has rubella, the incubation period for postnatally acquired rubella is roughly 14 to 21 days (often 16 to 18 days). A subclinical infection affects between 25% and 50% of people with no symptoms. The greatest levels of rubella virus in the respiratory tract and viraemia, which aid in transmission, coincide with the maximum time of infectivity, which lasts from seven days prior to the rash's beginning to seven days following it (Leung et al., 2019).

With a positive IgM test for the German squad in every game, the ultimate diagnosis of rubella virus is a suspected case. After ten days in February, the particular IgM antibodies were initially identified, and four months later, their size had increased to almost that level. After seven months of viral infection, this can continue for a few months. Three months later, all German immunoglobulins, including IgG, IgA, IgD, and IgE, include antibodies against the rubella virus (T. Hobbman, and J. Chantler, 2007). We are unable to differentiate between perinatal and congenital infections when the virus is detected after three weeks of life (Ross et al. 2011).

LITERATURE REVIEW

The identification of different immunoglobulins, particularly IgG and IgM antibodies in the complex against cytomegalovirus, is part of the serogroup-based diagnosis of rubella virus. Lastly, virus isolation or electronic antibody detection techniques are used to make the laboratory diagnosis of the epidemic in pregnant women. Due to its ability to prevent congenital and/or developing abnormalities, the rubella virus serology book is extremely important during pregnancy.

Public health regulations in Brazil require thorough screening for the measles virus when symptoms resemble rubella. Given the lack of epidemiological data on maternal infection previously available for the

province of Salahdin Health Directorate, Northern Technical University, and Karma Maternity and Emergency Hospital Anbar, Al_Anbar Province, Iraq (Lzim et al. 2018), this study is particularly important for students studying the democratic infection landscape and its relationships to social and geographic factors.

It also provides information on the general structure of the infection, which in turn influences its incidence. In our society in Iraq, many normal pregnant women were exposed to the rubella virus and chose a child with a congenital malformation. It is rarely known the serologic status of women prior to pregnancy and the prevalence of rubella infection useful during pregnancy. The study's objectives are to shed light on the discovery that the presence of the rubella virus is a positive factor for German pregnancies that end in miscarriage. Thus, the purpose of this German study was to employ a thorough test to diagnose measles infection in the early stages of pregnancy.

Study Period

February 2022 until December 2023

The study's location

Karma Maternity and Emergency Hospital Anbar, Northern Technical University, Salahdin Health Directorate, Al-Anbar Province, Iraq.

Gathering of Samples

Every participant in the study was read the consent form, and their signatures were collected. Each person filled out a separate form, which asked the following questions under three primary topics.

1. Details about the patient, including name, last name, age, residence, and occupation.
2. Pregnancy-related details include gestational week, number of pregnancies, pregnancy loss, and history of stillbirths or premature births.
3. They asked about educational background. Pregnant women suspected of having active Rubella infections were monitored for problems related to premature birth or stillbirth following delivery.

60 blood samples will be drawn from women in various situations; 30 samples will be drawn from pregnant women who have experienced multiple miscarriages (fetal loss), and 30 samples will be drawn from healthy women who are between the ages of 15 and 45 and who will be given a questionnaire. Age, residence, sample type (natural or aborted), and number of projections are among the details it contains.

The procedure involves taking venous blood samples. Five millilitres of blood are extracted using plastic medical syringes and transferred to a tube devoid of any anticoagulant medication. It contains the blood, which is allowed to coagulate at room temperature for half an hour before being separated. The serum is stored in tiny tubes at a temperature of -20 °C until it is needed. It is centrifuged for 15 minutes at a rate of 3000 cycles per minute.

Criteria for Inclusion

- People who are older than eighteen
- Those who are open to taking part in the research,

- Individuals without mental or auditory impairments,
- Those who are open to communication and cooperation,
- Individuals without a medical condition that necessitates hospitalization,
- Clinical or examination confirmation of pregnancy.
- The date of the last menstrual cycle, if it coincides with an ultrasound, or an ultrasound conducted prior to 20 weeks, is used to establish gestational age.

Criteria for Exclusion

- Not signing the TCLE (Free Consent and Clarification Form).
- Individuals whose gestational age is unknown.

The Study's Independent and Dependent Variables

Dependent Variables

CMV, rubella, infections.

Separate Variables

- a. Age, place of birth, occupation, education, social security, income, type of residence, number of people living together, number of spouse and self-marriages, number of pregnancies, number of stillbirths, number of premature births, number of abortions, type of birth, and history of surgeries (such as nail removal, rita application, tooth extraction, etc.) are sociodemographic and medical characteristics.
- b. Other risk factors and individual behaviors include: smoking, drinking alcohol, eating raw (unpasteurized) milk, meat, or eggs, eating processed foods (sausage, salami, etc.), eating unwashed fruits and vegetables, eating undercooked meat or meat products, using family dishes or glasses, washing your hands, having pets, gardening, or doing earthwork; getting a tattoo or piercing; getting a manicure or pedicure frequently; receiving blood transfusions; getting a rubella or CMV infection; having a family history of hepatitis; receiving a rubella vaccination, etc.

METHODOLOGY

After being extracted from the blood samples, the patient serums were kept at -80 °C in a deep freezer. The MINI VIDAS assay method was used to measure the levels of rubella IgG and IgM antibodies in blood samples. A few hours before to the commencement of the trial, blood serum samples were taken out of the freezer and given time to thaw. Following the kit's instructions, the designated tests were carried out as follows.

Immunoenzymatic Technique with Fluorescence Final Detection (ELFA)

The serum is diluted and a solid phase is employed. In the solid phase wall, the polyclonal Ab binds to the Igs. Furthermore, individual Igs are detected by the inactivated particular antigen, which is rendered visible by an anti-antigen monoclonal antibody in conjunction with alkaline phosphatase. A product (4-methyl-umbelliferyl) whose fluorescence is measured is the result of the hydrolysis reaction catalyzed by the substrate (4-methyl-umbelliferyl phosphate).



Figure 1. MINI VIDAS-Biomerieux Figure

Its great specificity makes it the most dependable way to confirm illnesses like cytomegalovirus and rubella that are detected in pregnant women.

Determinations of Biomerieux MINI VIDAS

- IgM and IgG rubella: [mini VIDAS kits: Vitek Immuno Diagnostic Assay System]

Mini Vidas Biomerieux's Analysis of the Parameters

- In women in the first trimester of pregnancy, rubella (IgM, IgG) is a congenital infection that can be extremely harmful to the fetus.

In accordance with the manufacturer's instructions, the avidity of Rubella virus IgG and IgM was evaluated and interpreted using a two-step enzyme immunoassay sandwich approach with a final fluorescence detection system (MINI VIDAS®-Compact multiparametric immunoanalyzer). The completely automated VIDAS machine performs this test as well as the computation and explanation of the results. A high-avidity result during the first 16 weeks of pregnancy allows the exclusion of a recently acquired pregnancy-related illness, according to the manufacturer.

The Steps of Action

IgM and IgG immunoglobulins for the cytomegalovirus and rubella virus are detected using the MINI VIDAS test.

A strip known as a strip is the initial component in which the serum is put. The ten holes in this strip are as follows:

- The hole in the sample.
- Holes 2, 3, 4, and 5 are empty.
- A six-hole connection.
- Buffer solution (buffer) for washing in steps 7, 8, and 9.
- The French business BIOMERIEUX's ready-made Basic Articlee test kit was utilized.

The second component is a little straw-like conical tube called an SPR.

- The SPR suctions the washing solution from one of the holes (7, 8, and 9) and returns it to one of the empty pits (2, 3, 4, and 5) because not all molecules interact. This ensures that only the bound antibody and antigen are left in the SPR. This process is repeated multiple times, and in the sixth hole we have the antibody + conjugate enzyme. The SPR contains the antibody-anti because it suctions the serum in the first hole, which causes

the antigen in the serum to react with the antibody in the sixth hole bound with the enzyme.

- The solution is suctioned out of one pit and then put back into the empty pits to remove the unreacted conjugated chemical.
- A substrate fluorescence is present in the last hole.
- An antigen and an enzyme linked to an antibody interact in the SPR, and the last hole contains a fluorescent substance.
- According to the theory of phosphorescent light, the components of the SPR interact with the fluorescent material until only the enzyme associated with the base material remains in the measuring cell. The lamp then flashes, and the particles absorb 370 energy and release 450 energy, which the device records as analysis results.

Notes

- Other catalysts present in the washing solution and conjugated molecule aid in bonding and interactions but enter and exit the process ineffectively.
- The amount of conjugated compound with the corresponding enzyme eaten increases with the amount of antigen in the serum.
- 4-methyl umbelliferyl phosphate serves as the basic material.
- Alkaline phosphatase ALP makes up the majority of the enzyme.
- The amount of base material consumed increases with the size of the enzyme utilized.

Data Collection Tools

Following the literature review, the researcher created a questionnaire form, which was employed as a data collection method (Annex-1). Four sections make up the questionnaire form. There are 42 questions in all, along with lab results.

- Introductory information; sociodemographic characteristics
- Habits; smoking/alcohol, nutrition and hygiene habits,
- General medical - obstetric history, Fetal loss, etc.,
- Other risk factors and laboratory findings.

Utilizing the Research

To assess the data collecting form's comprehensibility, 60 women who fit the research requirements were contacted for a preliminary application. The questions that were hard to grasp were changed after the pre-application. The analysis did not include the collected data.

At this point, the researcher herself conducted face-to-face interviews with 30 pregnant women (who had fetal loss) and 30 control women (who satisfied the research criteria) using the data collection form. Each patient who consented to participate in the study had their data collected over the course of 15 to 20 minutes. Complete venous blood samples were obtained from hospitalized pregnant patients. Antibodies against CMV-IgG, CMV-IgM, Rubella IgG, and Rubella IgM were examined.

Risks and Benefits

Because the research participants were simply subjected to blood collection and an interview where sociodemographic information was gathered, the hazards were kept to a minimum. The data produced by this study can be used to diagnose and comprehend the progression of a number of

hematological disorders in individuals with CMV and Rubella infections. These findings shed more light on the pathophysiology, morbidity, and primary risk behaviors linked to CMV and rubella infection in the research area.

The Ethical Aspect of Research

The research was conducted with permission from the Ethics and Survey Committee, Northern Technical University, and the Management of Salahdin Health Directorate, Karma Maternity and Emergency Hospital Anbar, Al_Anbar Province, Iraq. The research was voluntary, and participants were informed of its goal, the advantages it would offer, and the amount of time they would need to devote to the interview.

RESULT AND DISCUSSION

The age groups that scored the highest percentages in the current study were 21–30 and 31–40 years old (50.0% and 30.0%, respectively), whereas the age groups that earned the lowest percentages were ≤20 and >40 years old (13.3% and 6.7%, respectively) and controls (0.0% and 10.0%, respectively). While the differences between age groups and study groups were not significant (p>0.05), the differences between the percentages of age groups among patients and controls alone were significant (p<0.05).

Based on living, our investigation showed no differences between study groups and living of participants (p>0.05) (table 1).

Table 1. Comparative of Age Groups and Living with Patients Versus Controls

		Groups		Total	P value	
		patients (n=30)	controls (n=30)			
Age groups (years)	≤20	n	4	0	p>0.05	
		%	13.3%	0.0%		
	21-30	n	15	18		
		%	50.0%	60.0%		
	31-40	n	9	9		
		%	30.0%	30.0%		
	>40	n	2	3		
		%	6.7%	10.0%		
P value		P<0.05*	P<0.05*	P<0.05*		
Living	Rural	n	19	17	p>0.05	
		%	63.3%	56.7%		
	Urban	n	11	13		
		%	36.7%	43.3%		
	P value		P>0.05	P>0.05		P>0.05

Present findings showed the most patients with Rubella viruses with age group 21-40 years, and these findings were matched with results (Mohammed et al., 2023; Wang et al., 2022). The differences among age groups is related to sample size, immune status and chronic diseases in adults. According to earlier findings, the percentages of people aged 15–19, 20–24, 25–29, and 30–34 were

19.49%, 23.49%, 16.48%, and 10.34%, respectively. In the 20–24 and 25–29 age groups, the percentage of young women with rubella was higher than that of men (Wang et al., 2022). According to a different study, the prevalence of rubella virus infection peaked in children between the ages of 24 and 35 months, then declined until rising again in adolescents between the ages of 10 and 14. Due mainly to the decrease in maternally produced antibodies against these viruses to their lowest values by 6 months of age, infants ages 0–11 months had the lowest levels of rubella antibodies (Yan et al., 2024).

Gorun et al., (2021) showed there is no differences of rubella infection in rural than urban, and these findings matched with our study. The no differences of rubella infection in rural and urban refer to sample size and equal efficiency of vaccine in these regions. A recent study revealed a significant immunity gap that affects both urban and rural locations. The WHO must include the rubella vaccine in the National Immunization program in order to boost herd immunity and decrease the wide-spread immunity gap (Durowade et al., 2024).

Results of current study showed the positivity of Anti-Rubella IgM was lowest in patients (6.7%) and controls (3.3%) than negativity (93.3% and 96.7%) respectively with no significant differences ($p>0.05$). In contrast, our findings showed the positivity of Anti-Rubella IgG was highest in patients (90.0%) and controls (76.7%) than negativity (10.0% and 23.3%) respectively with no significant differences ($p>0.05$). Importantly, the differences between positivity and negativity for Anti-Rubella IgM and IgG for patients only and controls only were significant ($P<0.05$) (table 2).

Table 2. Comparative of Anti-Rubella IgM and IgG Antibodies with Patients Versus Controls

		Groups			Total	P value
			patients (n=30)	controls (n=30)		
Anti-Rubella IgM	Negative	n	28	29	57	p>0.05
		%	93.3%	96.7%	95.0%	
	Positive	n	2	1	3	
		%	6.7%	3.3%	5.0%	
P value			P<0.5*	P<0.5*	P<0.5*	
Anti-Rubella IgG	Negative	n	3	7	10	p>0.05
		%	10.0%	23.3%	16.7%	
	Positive	n	27	23	50	
		%	90.0%	76.7%	83.3%	
P value			P<0.5*	P<0.5*	P<0.5*	

Authors showed (90.2%) of pregnant women have rubella IgG and none were IgM (Mohammed et al., 2023). These findings were nearly to present study that showed (90.0%) of pregnant women have rubella IgG and (6.7%) have IgM antibody. Wang et al., (2022) showed the positivity of rubella IgG in pregnant was (86.93%). The differences among studies are related to sample size, vaccination, geographic site, and immune status. The immune system

starts a first immunological response when a virus is first encountered, either through illness or vaccination, which results in the development of different kinds of antibodies (Arnold et al., 2018). Antibodies against immunoglobulin M (IgM) are common in the early stages of infection. IgM is usually detectable two to five days after the rash appears during a rubella infection, and it stays that way for one to three months following the infection. As B cells convert classes to create immunoglobulin G (IgG) antibodies, IgM levels decrease (Tabatabaei et al., 2024). Shortly after IgM, anti-rubella IgG is found and peaks one to two weeks after the rash first occurs. IgG antibodies are distinct indicators of previous exposure to measles and rubella (either through vaccination or illness), and they usually last a lifetime (Wang et al., 2023). In order to produce high-affinity IgG antibodies and create a persistent antibody-mediated immune response after exposure, B cells must differentiate into memory B cells. Furthermore, memory B cells have the ability to terminally develop into long-lived plasma cells that produce antibodies, which often provides protection when a pathogen is encountered again (Brady et al., 2024).

Present outcomes showed the most infected women with Rubella virus were have one abortion (50.0%) and a little of them have three abortion (13.3%) with significant differences ($p < 0.05$).

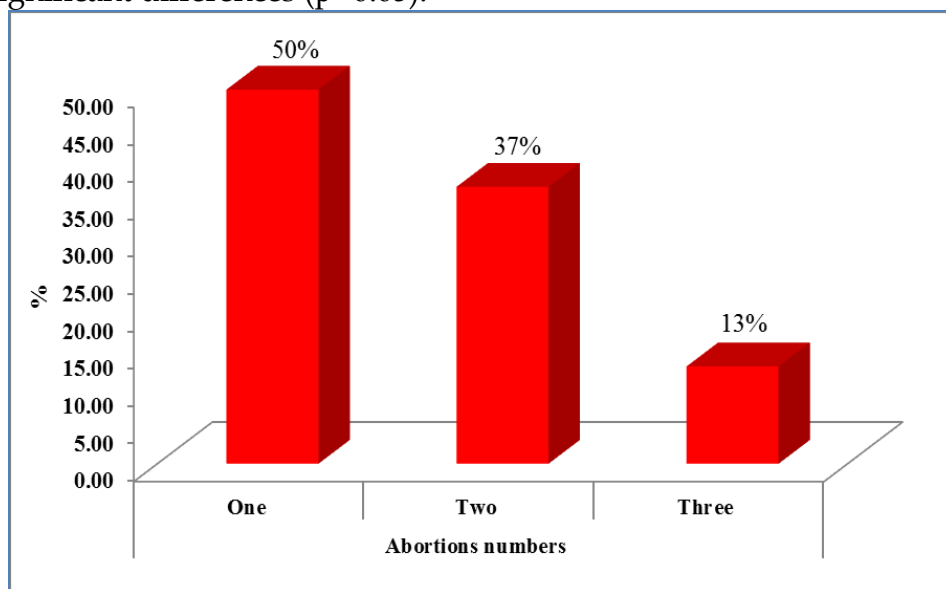


Figure 2. Frequency and Percentages of Abortions Numbers of Infected Women

Viral infections during pregnancy have been associated with poor pregnancy outcome. Rubella virus infection in early pregnancy has been implicated as one of the causes of spontaneous abortion (Lulandala et al., 2017). Mohammed and Kokaz, (2019) showed (91.89% and 5.78%) of aborted women have anti-Rubella IgG and IgM antibodies, and these results were matched to our study that showed (90% and 6.7%) of aborted women have above antibodies. The low rate of rubella IgM and a high proportion of rubella IgG for the most aborted women in this study suggest that rubella infection might indicate a previous infection (Abbas et al. Mohsin, (2021) showed the most

infected women with Rubella virus were have one abortion (56.0%) and a little of them have three abortion (4.12%), and these findings were nearly to our study.

Authors showed that most women are protected from rubella virus infection through possessing a high level of IgG; however, there is a considerable proportion of women with evidence of acute infection which indicate that the virus is endemic in the Tanzania area (Mohammed and Kokaz, 2019).

Authors showed that there is no effect of age on the seroprevalence of rubella virus antibodies. The prenatal screening for anti-IgG & anti-IgM - rubella antibodies is found to be a necessary procedure for active infections determination, and providing obstetric managements to prevent risks of congenital rubella (Mohsin, 2021).

Results of current study showed the most infected women have one abortion lie within 21-30 years (73.3%), two and three abortions at 31-40 years (45.5% and 100.0%) respectively, with significant differences ($P < 0.05$).

Additionally, our findings showed most infected women have one abortion live in urban (53.3%), two abortions live in rural (90.9%) and three abortions live in equal percentages in rural and urban (50.0%) with significant differences ($P < 0.05$) (table 3).

Table 3. Comparative of Abortions Numbers of Infected Women with Age Groups and Living

		Abortions numbers			Total	P value
		One	Two	Three		
Age groups (years)	≤20	n	4	0	0	p<0.05*
		%	26.7%	0.0%	0.0%	
	21-30	n	11	4	0	15
		%	73.3%	36.4%	0.0%	50.0%
	31-40	n	0	5	4	9
		%	0.0%	45.5%	100.0%	30.0%
	>40	n	0	2	0	2
		%	0.0%	18.2%	0.0%	6.7%
Living	Rural	n	7	10	2	p<0.05*
		%	46.7%	90.9%	50.0%	
	Urban	n	8	1	2	11
		%	53.3%	9.1%	50.0%	36.7%

Mohammed and Kokaz, (2019) showed the most aborted women with rubella infection living in urban area, and these findings were matched with results (Mohsin, 2021). These findings not matched with our study that showed most them living in rural area. The differences among study are related to geographical site.

Present investigation showed significant increased ($P < 0.05$) levels of ESR in patients (37.63 ± 10.28) than controls (23.27 ± 8.53). In contrast, our findings

showed no significant differences ($P>0.05$) between levels of haemoglobin and WBCs with study groups (table 4 and figure 2).

Table 4. Comparative of Haematological Indicators with Patients Versus Controls

Groups		N	Mean	Std. Deviation	P value
ESR (mm/h)	Patients	30	37.63	10.28	$P<0.05^*$
	Controls	30	23.27	8.53	
Hemoglobin (g/dl)	Patients	30	11.74	0.78	$P>0.05$
	Controls	30	11.30	0.97	
WBC * 10⁹	Patients	30	9166.67	1784.48	$P>0.05$
	Controls	30	8536.67	1887.43	

Normally, red blood cells sink slowly, but inflammation makes red blood cells stick together in clumps. These clumps of cells are heavier than single cells, so they sink faster. If an ESR test shows that red blood cells sink faster than normal, it may mean people have microbial infection causing inflammation (Lapić et al., 2020). During a viral infection, slightly higher ESR levels are predictive. Adenovirus infections can have a mean ESR of 40 mm/hr, while the majority of viral upper respiratory tract infections have a mean ESR of about 20 mm/hr (Mao and Wu, 2024).

In a healthy child or adolescent, the diagnosis of rubella is made on a clinical basis, and a laboratory workup is not necessary. A WBC count, if performed, may be lower than normal, as in many viral infections, with increased percentages in the lymphocyte count (Hodgins and Hill, 2021).

The pregnant mother may become more vulnerable to infections because to immunomodulation, which mediates the allogeneic foetus's tolerance during pregnancy. A prior study found that pregnant women using Covid-19 had higher basophil counts and lower WBC levels. There is, however, little information on how viral infections affect basophil counts. These blood parameter changes are not enough to constitute a unique disease pattern, even though they provide hints regarding the existence of infection (Ergün et al., 2023).

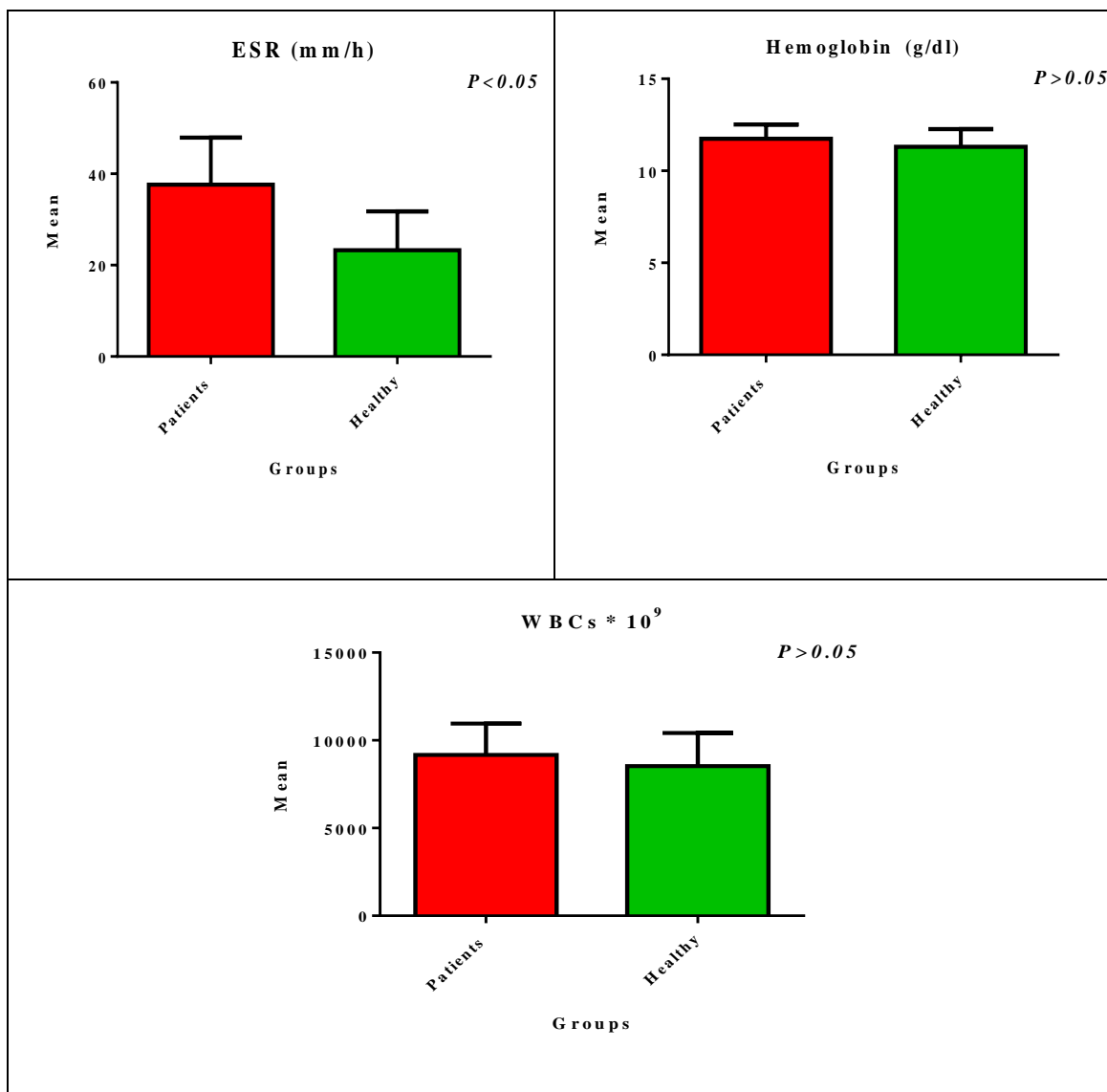


Figure 2. Mean Levels of Haematological Indicators within Study Groups

Results of present study showed no significant differences ($P < 0.05$) between positivity of Anti-Rubella IgM and IgG antibodies with age groups, living and abortion numbers of infected women (table 5 and 6).

Table 5. Comparative of Anti-Rubella IgM and IgG Antibodies with Age Groups and Living

		Anti-Rubella IgM		Anti-Rubella IgG	
		negative (n=28)	positive (n=2)	negative	positive
Age groups (years)	≤ 20	n	3	1	3
		%	10.7%	50.0%	33.3%
21-30	n	15	0	0	15
	%	53.6%	0.0%	0.0%	55.6%
31-40	n	8	1	1	8
	%	28.6%	50.0%	33.3%	29.6%
>40	n	2	0	1	1

		%	7.1%	0.0%	33.3%	3.7%
	p value		p>0.05		p>0.05	
Living	Rural	n	18	1	2	17
		%	64.3%	50.0%	66.7%	63.0%
	Urban	n	10	1	1	10
		%	35.7%	50.0%	33.3%	37.0%
	p value		p>0.05		p>0.05	

According to a recent study conducted in Italy, the overall seroprevalence of rubella in adults is high, at 92.3%. This implies that by the time they are 18 years old, a sizable segment of the population has developed immunity, either as a result of immunization or viral exposure (Bechini et al., 2024). According to a prior study, the prevalence of rubella antibodies was 90 percent in women aged 18–29, 94.1% in women aged 30–39, and 90.7% in women aged 40–49 (Toscana et al., 2022). The authors demonstrated that pregnant women in the 17–24, 25–34, and 35–44 age groups had positive rubella IgG antibody levels (92.5%, 85.2%, and 82.8%, respectively). Additionally, they discovered that pregnant women who were primiparous (92.5%) and multiparous (83.3%) had significantly different IgG seropositivity statuses (Alaoui et al., 2023). According to a recent study, India's incidence of CRS has significantly dropped since the country's measles-rubella (MR) vaccination campaign. In India, 15% of women who are of reproductive age are susceptible to rubella infection because they do not have protection to the virus. Maintaining high rates of rubella vaccination among children is essential to preventing rubella virus exposure among women of childbearing age who are susceptible to rubella, as the national immunization program does not offer routine rubella vaccination opportunities for this age group (Shanmugasundaram et al., 2024).

Children ages 10 and under have seroprevalences of rubella IgG and IgM antibodies, according to a recent study. The need for an efficient rubella vaccination program to avoid congenital rubella syndrome (CRS) is highlighted by the strong correlations found between rubella seropositivity and characteristics such as age ≥ 5 years and a lack of western education (Waziri et al., 2024). According to a prior study, the seroprevalence of rubella IgM in newborns was 0.4%. IgG and IgM antibody tests were negative in 30.9% of newborns. 79.3% of expectant mothers tested positive for rubella IgG. IgM against the rubella virus was positive in 0.8% of the pregnant women. In pregnant women, the seronegative results for rubella IgG and IgM antibodies were 19.8%. Many newborns are still at danger of contracting the rubella virus because of the negative rubella-specific IgG antibodies. Since some newborns and expectant mothers have been shown to have rubella-specific IgM antibody positivity, the rubella virus is still spreading. In order to boost immunization levels against rubella with periodic sero-surveillance, women of childbearing

age may be vaccinated against the disease (Wang et al., 2023). The authors demonstrated that children's rubella antibody titers were lower 12 months prior to immunization and reached a positive level 18 months after vaccination. Conversely, waning antibodies may be the cause of lower Rubella IgG levels in children aged 5 to 6 as opposed to those aged 18 months. As expected from the results of the national vaccination program in 2024, pregnant women showed high levels of protection against these viruses (more than 80% had positive rubella IgG) (Tabatabaei et al., 2024).

According to a different study, the high percentage of expectant mothers who have been exposed to the rubella virus, especially in cities, suggests that the infection is prevalent in Ethiopia. Congenital rubella syndrome (CRS) may be significant in the study area, as evidenced by the observed percentage of recent infections, especially in first-trimester pregnant women. These results advocate for measures to lower the risk of CRS, such as adding vaccinations to the regular childhood immunization program and vaccinating vulnerable women of reproductive age against the rubella virus (Asrat et al., 2023).

Vaccination programmes need to be updated to ensure that campaigns reach their specified goals. Thus, implementing an effective, large-scale screening programme for congenital rubella infection in different regions of world is highly recommended. On the other hand, seronegative pregnant women should be given special preventive care and health education about rubella transmission and congenital rubella syndrome sequelae (Alaoui et al., 2023).

Table 6. Comparative of Anti-Rubella IgM and IgG Antibodies with Abortions Numbers of Infected Women

		Anti-Rubella IgM		Anti-Rubella IgG		
		negative (n=28)	positive (n=2)	negative	positive	
Abortions	One	n	14	1	14	
		%	50.0%	50.0%	33.3%	51.9%
	Two	n	10	1	2	9
		%	35.7%	50.0%	66.7%	33.3%
	Three	n	4	0	0	4
		%	14.3%	0.0%	0.0%	14.8%
p value		p>0.05		p>0.05		

Previous study showed the Rubella IgG levels didn't have any effect on women during their pregnancy. The cause of abortion in the present study may not be rubella infection but other like microorganism infections including CMV, toxoplasmosis, bacterial infection, and genetic factors in some cases. Moreover, it was observed in a study that recent and past exposure to rubella was not influenced by the trimester of pregnancy, as was previously reported in Nigeria (Tamirat et al., 2017). The risk of vertical transmission to the foetus in case of rubella occurrence in the first trimester of pregnancy is much higher (90%).

There was no treatment available for active rubella infection; therefore, a routine prenatal screening would help detect the infection (Hamad et al., 2022).

CONCLUSIONS AND RECOMMENDATIONS

Numerical indicators were appeared as Mean \pm SD. Student t test depended to reveal differences between patients versus healthy. Nominal features were expressed as frequency and percentage, and the differences among them detected by Pearson-Chi-square test. $P \leq 0.05$ was applied to reveal statistical variations. SPSS v. 23.0 and Prism v.6 statistical software programs were depended for analysis our results.

FURTHER STUDY

This research still has limitations so further research is still needed on this topic.

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