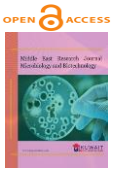

Middle East Research Journal of Microbiology and Biotechnology
ISSN: **2789-8644 (Print & Open Access)**
Frequency: Bi-Monthly
DOI: https://doi.org/10.36348/merjmb.2026.v06i03.009

KUWAIT SCHOLARS PUBLISHER
Website: http://www.kspublisher.com/
Email: office.kspublisher@gmail.com

Prevalence of Herpes Simplex Virus Antibodies and Risk Factors among Pregnant Women in Al Diwaniyah City

Ahmed R. Wajid[1*], Mustafa H. Al-Bayati[2]
[1]Ministry of Education / General Directorate of Education of Al-Qadisiyah
[2]Department of Conservative and Preventive Dentistry, College of Dentistry, University of Al-Qadisiyah, Al Diwaniyah, Iraq

Abstract: ***Background:*** Herpes simplex virus types 2 (HSV-2) infection is a common sexually transmitted infection that is chronic, incurable, and characterized by repeated outbreaks and persistent reactivation. The vaginal mucosa is the main organ affected by HSV-2. Neonatal herpes may result via the virus's vertical transmission, which occurs when a mother gives birth to her kid. Because the virus can infect multiple organ systems, including the liver and lungs, this dangerous infection puts neonates at high risk for morbidity and mortality and can be lethal if treatment is not received. This study aimed to detect type 2 HSV-2 antibodies and investigate associated risk factors in Al Diwaniyah City. ***Methodology*:** Eighty pregnant patients who visited the Maternity as well as Children's Hospital into Diwaniyah between May 10 - August 30, 2025, participated in this cross-sectional study. To screen for HSV-2 antibodies (IgM and IgG) using the enzyme-linked immunosorbent assay (ELISA), blood samples were obtained. A systematic questionnaire was used to gather data, which SPSS version 20 was used to statistically analyze after being input into Microsoft Excel. For statistical significance, a p-value in less than 0.05 was used. In descriptive statistics, both absolute & relative values were used. ***Results*:** The 80 pregnant participants in this study had an average age of 26, with a standard deviation at ±5.5. Their ages varied from 16 to 38. IgM and IgG antibodies were present in 62.5% of cases. IgG and IgM serological positive rates were 61.2% (n = 49) and 2.5% (n = 2), respectively. Pregnant women between the ages of 20 and 28 (4.76%) who lived in urban areas (8.7%) accounted for the IgM positive antibody cases reported in this study. The IgM a positive antibody patients described in this study were pregnant women between ages from 20 and 28 (4.76%) who were urban dwellers (8.7%). Furthermore, there was not a statistically significant distinction in IgG positivity between pregnant women with rural areas (80.70%) and women with higher education (65.52%) and secondary education (57.14%). ***Conclusion*:** Pregnant women in Al Diwaniyah, Iraq, were found to have a considerable frequency of antibodies of the type 2 herpes simplex virus (HSV-2), with IgG antibody being significantly more common than IgM antibodies. These results highlight the significance of HSV-2 screening and surveillance in pregnant women, especially in the second trimester, as well as in women in a history in miscarriage, who showed a greater incidence of antibodies.

Keywords: Herpes Simplex Virus Type, Risk Factors, Seroprevalence, Pregnant Women.

Research Paper

***Corresponding Author:**
Ahmed R. Wajid
Ministry of Education / General Directorate of Education of Al-Qadisiyah

How to cite this paper:
Wajid, A. R., & Al-Bayati, M. H. (2026), Prevalence of Herpes Simplex Virus Antibodies and Risk Factors among Pregnant Women in Al Diwaniyah City. *Middle East Res J. Microbiol Biotechnol*, *6*(3), 209-214. https://doi.org/10.36348/merjmb.2026.v06i03.009

Article History:
| Submit: 17.07.2026 |
| Accepted: 19.08.2026 |
| Published: 22.08.2026 |

INTRODUCTION

Herpes simplex virus type 2 (HSV-2) belongs to the herpesvirus family, specifically the alpha-herpesvirus subfamily of human herpesviruses [1]. HSV-1 and HSV-2 are two immunologically similar HSV strains that cause persistent, lifelong infections with sporadic reactivation. HSV-1 typically causes oral and lip sores, HSV-2 is the most a common cause of genital herpes worldwide. It can infect both males and females [2].

HSV-2 is a common, persistent, and incurable sexually transmitted infection that is characterized by recurrent outbreaks and prolonged reactivation [3, 4]. HSV-2 infection primarily affects the genital mucosa. Neonatal herpes can also result from HSV-2 being vertically transmitted between mother to child during childbirth [5]. Because the virus can spread to multiple organ systems, this severe infection offers serious health concerns to infants, resulting in high morbidity and mortality (such as the liver and lungs), potentially causing death if left untreated [6].

Due to the reduced levels of the maternal antibodies that form to protect the unborn child, the risk of infection rises during the mother's main infection of third trimester of pregnancy [5, 6].

More recent studies, updating global epidemiological data up to 2020, show that 520 million individuals between the ages of 15 and 49 have genital herpes simplex virus, type 2 (HSV-2) infection (≈ 13%), with tens of millions of new infections annually [7]. Genital herpes simplex virus type 1 (HSV-1) contributes significantly to the burden of genital ulcer disease [8, 9].

Among the most significant risk factors for contracting genital herpes, type 2 are age and sex [10]. Therefore, the aim of this study is to ascertain the frequency and existence of HSV-2 IgM and IgG antibodies of pregnant women in Diwaniyah, and to study the relationship of these antibodies with various study variables such as age, sex, educational level, gestational age, and number of miscarriages.

MATERIALS AND METHODS

1. Study Design and Participants

Eighty pregnant patients who visited the Maternity as well Children's Hospital in Diwaniyah City between May 10 to August 30, 2025, participated in this cross-sectional study. Eligibility requirements, which included informed consent and routine clinic follow-up during pregnancy, were used to choose participants. Finding antibodies to the herpes simplex virus, type 2 (HSV-2) was the goal and examine related risk factors. A standardized questionnaire including both quantitative and qualitative data was filled out by each participant.

2. Ethical Considerations

This study was conducted after obtaining ethical consent, with all pregnant women in the study sample voluntarily agreeing to participate. To ensure confidentiality, to preserve their privacy, the name of the patient was kept secret during the study time.

3. Blood Sample Collection and Analysis

In dry venous aspiration tube, 5 ml of venous blood were drawn under sterile conditions. The central laboratory received the specimens right away. To extract the serum, the blood sample were centrifuged for five minutes at 3000 rpm. After that, the serum was kept until a serological examination. As indicated by the manufacturer, the enzyme-linked immunosorbent assay (ELISA) was used to identify IgM and IgG antibodies against the herpes simplex virus, type 2 (HSV-2).

4. Statistical Analysis

SPSS version 20 was used for statistical analysis, and a p-value of less than 0.05 was deemed significant. In descriptive statistics, both absolute & relative values were used.

RESULTS

1-Distribution of Social and Demographic Characteristics of the Study Samples

This study included 80 pregnant women, ages 16 to 38, with a mean age of 26 & a standard deviation at ±5.5. The majority of participants were in the 20–28 range (52.5%, n = 42), having completed secondary school (43.75%, n = 35), Higher education level (36.25%, n = 29), primary school education (13.75%, n = 11), no formal education (6.25%, n = 5) lived in Rural areas (71.25%, n = 57), identified as worker (48.75%, n = 39) (see Table 1).

Table 1: Distribution of social and demographic characteristics of the study samples

Variables	Total (N = 80)	Percentage (%)
The age		
16–20	22	27.5
20–28	42	52.5
29–38	16	20.0
Education level		

Variables	Total (N = 80)	Percentage (%)
No formal education	5	6.25
Primary	11	13.75
Secondary	35	43.75
Higher	29	36.25
Zone		
Rural	57	71.25
Urban	23	28.75
Occupation		
Housewife	21	26.25
Worker	39	48.75
Student	20	25

2-Distribution of Behavioral Risks among Participants in the Study Samples

Table 2 shows that 48.75% (n = 39) 25% (20/80) of pregnant women experienced an abortion at the same time as a second-semester pregnancy.

Table 2: Distribution of behavioral risks among participants in the study samples

Variables	Frequency (N = 80)	Percentage (%)
Age of pregnancy		
First trimester	26	32.5
Second trimester	39	48.75
Third trimester	15	18.75
Number of abortions		
Zero	60	75
≥1	20	25

3- C-Distribution of Antibodies Anti-HSV-2 (IgM and IgG) among Study Samples

The overall carriage rate of antibodies (IgM and IgG) among the 80 pregnant participants in this study was 62.5%. IgM and IgG seropositivity rates were 2.5% (n = 2) and 61.2.(n=49) respectively (Fig. 1).

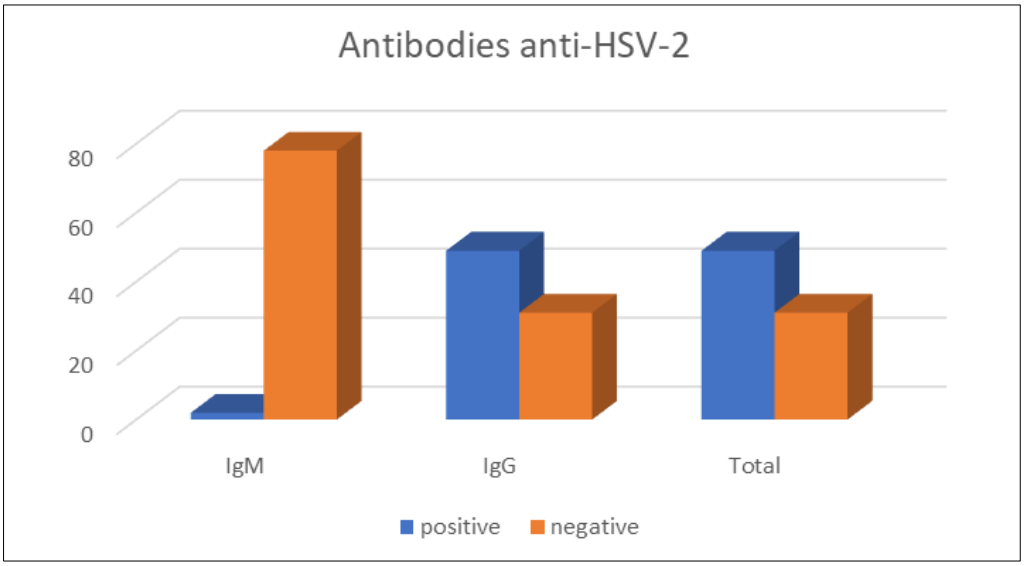

Fig. 1: Distribution of the antibodies anti-HSV-2 (IgM and IgG) of study samples

4-D-Distribution of Sociodemographic Characteristics According to Antibodies Anti-HSV-2

Table 3 below shows that pregnant women between the ages of 20 and 28 (4.76%) who lived in urban areas (8.7%) were among the IgM positive antibody patients identified in this study, with one group having no formal education (20%) and another having higher education (3.45%), and one group being employed (5.13%), with no discernible difference. Both the 20–28 (59.52%) and 29–38 (87.5%) age groups had high levels of IgG seropositivity, which was substantially correlated with age group ($X^2 = 7.35$; $p = 0.05$). Furthermore, pregnant women in secondary school (57.14%), higher education (65.52%), as well as

rural areas (80.70%) had high IgG rates. with no significant difference.

Table 3: Distribution of antibodies to herpes simplex virus type 2 (IgM and IgG) by sociodemographic characteristics

Variables	Anti-HSV-2 IgM IgM + 2 (%)	IgM − 78 (%)	X^2 (p-value)	Anti-HSV-2 IgG IgG + 49 (%)	IgG − 31 (%)	X^2 (p-value)
Age (in years)						**7.35 (0.05)**
16–20	0	22 (100)	1.85 (0.05)	10 (45.45)	12 (54.55)	
20–28	2 (4.76)	40 (95.24)		25 (59.52)	17(40.48)	
29–38	0	16 (100)		14 (87.5)	2 (12.5)	
Education level						
No formal education	1(20)	4 (80)	7.81(0.05)	2 (40)	3 (60)	**2.03 (0.05)**
Primary	0	10 (100)		8 (72.73)	3(27.27)	
Secondary	0	36 (100)		20 (57.14)	15 (42.86)	
Higher	1 (3.45)	28 (96.55)		19 (65.52)	10 (34.48)	
Zone						
Rural	0	57 (100)	3.841 (0.05)	46 (80.70)	11 (19.30)	**3.841 (0.05)**
Urban	2 (8.7)	21 (91.3)		3 (13.04)	20 (86.96)	
Occupation						
Housewife	0	21 (100)	5.99(0.05)	11 (52.38)	10 (57.62)	**5.74(0.05)**
Worker	2 (5.13)	37 (94.87)		29 (74.36)	10 25.64)	
Student	0	20 (100)		9 (45)	11 (55)	

Note: X^2: Chi-square.

5. D-Distribution of Behaviors According to Antibodies Anti-HSV-2 (IgM and IgG)

IgM seropositivity was only detected in pregnant women, as Table 4 demonstrates. The seropositivity rate in IgM was higher among pregnant women at the 20–28 age range (4.76%), during the second trimester the pregnancy (5.13%), between those who had experienced at least one miscarriage (5%), among those who had never experienced a miscarriage (1.67%), as well among those who did not use condoms during intercourse (58.18%), with a statistically significant difference.

Table 4: Distribution of antibodies to herpes simplex virus type 2 (IgM and IgG) according to behaviors

Variables	Anti-HSV-2 IgM IgM + 2 (%)	IgM − 78 (%)	X^2 (p-value)	Anti-HSV-2 IgG IgG + 49 (%)	IgG − 31 (%)	X^2 (p-value)
Age of pregnancy						
First trimester	0	26 (100)	2.16 (0.05)	9 (34.62)	17 (65.38)	5.99 (0.05)
Second trimester	2 (5.13)	37 (94.87)		33 (84.62)	6 (15.38)	
Third trimester	0	15 (100)		7 (46.67)	8 (53.33)	
Number of abortions						
Zero	1 (1.67)	59(98.33)	0.68 (0.05)	35 (58.33)	25 (41.67)	0.86 (0.05)
≥1	1(5)	19 (95)		14 (70)	6 (30)	

Note: X^2: Chi-square.

DISCUSSION

Pregnant women infected with the herpes simplex virus of type 2 (HSV-2) may experience congenital and neonatal herpes, miscarriage, and early birth. For disease prevention initiatives, providing precise epidemiological data via seroprevalence studies is crucial [11].

This study sought to determine the prevalence to HSV-2 antibodies in a pregnant Diwaniyah women and associated risk factors. Our results showed that 62.5% to pregnant women had high levels of HSV-2 antibodies overall, which suggests a high risk of infection. In comparison, a study by [12]. According to reports, In Nigeria, 44.3% of people have HSV-2 antibodies, which is far lower than that which our study discovered.

In Saudi Arabia, 0.5% of pregnant women were found to have detectable levels of IgM antibodies to HSV-2 [13]. In Turkey, these antibodies were found in 11.3% of 130 pregnant women [14]. Compared to other national and international studies, our results were relatively low and contradict those of another researcher. For example, Tiwari *et al.*, found that 66.7% of women had a TORCH infection [15].

The results of all these studies point to the significant role of HSV-2 in causing infections affecting pregnant women and their fetuses. Data from primary

healthcare facilities, where prevalence rates vary from 30% to 80% among women and from 10% to 50% for men, further supports the high prevalence for HSV-2 antibodies to poor locations [16].

In our current investigation, the prevalence to IgM antibodies in herpes simplex virus of type 2 (HSV-2) was (2.5%) (n = 2). IgM antibodies are thought to be a sign of a recent infection and an infection that is healing. This percentage was found to be comparatively lower than that obtained in two different investigations in Saudi Arabia, where the prevalence to IgM antibody positive to HSV-2 among pregnant women was 27.1% & 6.5%, respectively [13-17]. This is also very different from what Ahmed *et al.,* [10]. In their study, they found a 38% IgM antibody positive rate. IgM antibody positivity differed statistically significantly from risk variables as age, residence, and occupation, while no statistically significant difference was found regarding educational level. However, in our analysis, pregnant women between the ages of 20 and 28 who were in the 2nd trimester accounted for 13.5% of the cases in IgM antibody positive; one of these women had a history of miscarriage. (5%). Our findings are consistent with those of (10), who found a statistically significant correlation between IgM antibody positivity and age distribution (p = 0.001). According to their findings, the second trimester had the highest IgM antibody positivity (34.2%), while [18], showed that the rate of IgM antibody positivity in second trimester did not vary significantly. Furthermore, no difference was identified between IgM antibody positivity as well as the age distribution for pregnant women [18].

The small sample size and sampling techniques employed in this study are responsible for the lack of statistical significance regarding educational level. The overall IgG antibody positivity rate in this study was 61.2% (n = 49). Given a high IgG antibody incidence, pregnant women to this region may have been exposed to the virus. This finding confirms the results of several studies conducted in different parts of the world; it also discovered that pregnant women had high IgG positivity rates [10-19].

This study also demonstrated a significant association between IgG antibody positivity and the women's age group in terms of risk factors, with the rates being highest among women aged 20–28 years (59.52%). This finding contrasts with that of [10], who found a significant proportion of IgG antibody positive in the blood in pregnant women age 15–24 years. Pregnant women for the second trimester of pregnancy had the highest IgG antibody positive rate (84.62%) in our current study [20]. Also [18], reported similar results, finding that IgG antibody positivity was highest in the second and third trimesters of pregnancy. Our findings contrast with those of [10], who demonstrated that the first trimester had the highest proportion of IgG antibody positive for herpes virus type 2. The short sample size and data collection technique employed in our study may account for this discrepancy. Pregnant women without a history of miscarriage had a greater proportion of IgG antibody positive (58.33%), without a statistically significant difference. These results are consistent with those of [10], who found that women without a history of miscarriage had a higher IgG prevalence (54.3%). There was no statistically significant correlation between gestational age and serum IgG positivity in this investigation.

It is important to keep in mind that type 2 herpes simplex virus (HSV-2) infections are systematically influenced by particular behaviors, just as the majority of sexually transmitted diseases, the majority of which are indicative of adverse socioeconomic circumstances [21, 22].

Given the nature of HSV-2 transmission, the conservative nature of Iraqi society, i.e., adherence to prevailing moral principles, may explain its low prevalence. This interpretation is supported by several studies conducted in Northeast India, Results revealed that Christians had a greater percentage to HSV-2 antibody positivity (12.6%) than Muslims (3.8%) [23]. Furthermore, there are no vaccination programs to immunize pregnant women at risk of infection.

CONCLUSIONS

The study discovered that pregnant women in Diwaniyah, Iraq, have a high incidence of antibodies in herpes simplex virus type 2 (HSV-2), IgG antibody positivity is substantially greater than IgM antibody positivity. These results highlight a significance of HSV-2 screening and monitoring in the pregnant women, increased antibody frequency was seen, particularly in the 2nd trimester and in women with history of miscarriage. Despite the comparatively low prevalence of recent infection (IgM), the presence of IgG antibodies suggests continued exposure to the virus and the potential for fetal transmission.

REFERENCES

1. Draganova EB, Valentin J, Heldwein EE. The ins and outs of herpesviral capsids: divergent structures and assembly mechanisms across the three subfamilies. *Viruses*. 2021;13(10):1–20.
2. Zerbini FM, Siddell SG, Lefkowitz EJ, Mushegian AR, Adriaenssens EM, Alfenas-Zerbini P, *et al.* Changes to virus taxonomy and the ICTV statutes ratified by the International Committee on Taxonomy of Viruses. *2023 Arch Virol*. 2023;168(7):1–11.

3. Omarova S, Cannon A, Weiss W, Bruccoleri A, Puccio J. Genital herpes simplex virus—an updated review. *Adv Pediatr*. 2022;69(1):149–62.
4. Marcocci ME, Napoletani G, Protto V, Kolesova O, Piacentini R, Li Puma DD, *et al.* Herpes simplex virus-1 in the brain: the dark side of a sneaky infection. *Trends Microbiol*. 2020;28(10):808–20.
5. James C, Harfouche M, Welton NJ, Turner KM, Abu-Raddad LJ, Gottlieb SL, *et al.* Herpes simplex virus: global infection prevalence and incidence estimates, 2016. *BullWorld Health Organ*. 2020;98(5):315–29.
6. De Rose DU, Bompard S, Maddaloni C, Bersani I, Martini L, Santisi A, *et al.* Neonatal herpes simplex virus infection: from the maternal infection to the child outcome. *J Med Virol*. 2023;95(8):1–14.
7. Cole S. Herpes simplex virus: epidemiology, diagnosis, and treatment. *Nurs Clin North Am*. 2020;55(3):337–45.
8. Harfouche M, AlMukdad S, Alareeki A, Osman AMM, Gottlieb S, Rowley J, et al. Estimated global and regional incidence and prevalence of herpes simplex virus infections and genital ulcer disease in 2020: mathematical modelling analyses. Sex Transm Infect. 2025;101(4):214–23
9. World Health Organization. Herpes simplex virus: Fact sheet (updated 2025). Geneva: WHO; 2025. (Online).
10. Ahmed H, Abbu N, Saeed S, Abdalla W, MohammedSalih K, Alla AA, *et al.* Seroprevalence of herpes simplex virus type-2 among pregnant women in Wad Madani-Sudan: a cross-sectional study. *F1000Res*. 2022; 11:752. doi: 10.12688.
11. Kimberlin, D W. Herpes simplex virus infections of the newborn. *Semin Perinatol* 2011; 31:19-25.
12. Iche KE. Seroprevalence of herpes simplex virus infections among pregnant women attending antenatal clinic in Benin, Nigeria. *Int J Trop Dis Health*. 2014;4(1):70–81.
13. Alzahrani, A J, Obeid, O E, Almulhim A A, *et al*. Analysis of herpes simplex 1and 2 IgG and IgM antibodies in pregnant women and their neonates. *Saudi J Obstet Gynaecol 2005* 5: 53.
14. Duran, N, Yarkin F, Evruke C and Koksal F. Asymptomatic herpes simplex virus type-2 (HSV-2) infection among pregnant women in turkey. *Indian J Med Res.* 2004; 120:106-10.
15. Tiwari S, Arora BS, Diwan R. TORCH IgM seroprevalence in women with abortions as adverse reproductive outcome in current pregnancy. *Int J Res Med Sci*. 2016;4(3):784–8.
16. Daniels B, Wand H, Ramjee G, the MDP Team. Prevalence of herpes simplex virus 2 (HSV-2) infection and associated risk factors in a cohort of HIV negative women in Durban, South Africa. *BMC Res Notes*. 2016;9(1):1–8.
17. Gengiz, L, Klyan M, Kara F and Ugurel M S Detection of herpes simplex virus and IgG and IgM by ELISA in cord blood and sera of mothers with pregnancy complications. *Mikrobiyol. Bul.* 2002; 27:299-7.
18. Amar OAO, Bajaj HK, Gupta N, Singla A, Masih H. Prevalence of herpes simplex virus in pregnant women from Gangetic Plain Region of Allahabad, India. *Adv Microbiol*. 2015;5(6):404–8.
19. C. BC, Zaba F, Meite S, Mlan A, Inwoley K, Kouassi M, *et al.* Seroprevalence of herpes simplex virus 2 infection among pregnant women in urban health training Yopougon-Attie (Cote D'Ivoire). *JMLD*. 2015;6(3):17–21.
20. Anaedobe CG, Ajani TA. Co-infection of herpes simplex virus type 2 and HIV infections among pregnant women in Ibadan, Nigeria. *J Glob InfectDis*. 2019;11(1):19–24.
21. Buffardi AL, Thomas KK, Holmes KK, Manhart LE. Moving upstream: ecosocial and psychosocial correlates of sexually transmitted infections among young adults in the United States. *Am J Public Health*. 2008;98(6):1128–36.
22. O'Leary A, Broadwell SD, Yao P, Hasin D. Major depression, alcohol and drug use disorders do not appear to account for the sexually transmitted disease and HIV epidemics in the southern United States. *Sex Transm Dis*. 2006;33(7): S70–7.
23. Biswas, D.; borkakoty, B.; Mahanta, J.; walia, K.; Saikia, l.; *et al*. Seroprevalence and risk factors of herpes simplex type-2 infection among pregnant women in northeast India. *BMC Infec. Dis*. 2011; 11(325).