

## Seroprevalence of Anti- Herpes Simplex Virus Type2 IgG, IgM Antibodies Among Pregnant Women in Diyala Province

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### Abstract

**Background:** Herpes simplex virus type 2 (HSV-2) is the leading cause of genital ulcer disease worldwide. The acquisition of genital herpes during pregnancy has been associated with spontaneous abortion, prematurity, and congenital and neonatal herpes.

**Objectives:** To determine the seroprevalence of herpes simplex virus type 2 among pregnant women in Diyala province.

**Materials and methods:** Ninety one pregnant women were chosen from those attending the primary health care centers in Baquba - Diyala province, during the period from 1<sup>st</sup> November / 2012 till 30<sup>th</sup> April / 2013. The age range between (15-37) years and the mean age was (25.10 ± 5.27) years. Anti- herpes simplex virus type 2 IgM and IgG antibodies were assayed by Enzyme linked immunosorbant assay technique. (ELISA).

**Results:** The results showed that the anti- herpes simplex virus type 2 IgG, IgM antibodies seroprevalence among pregnant women was 2 out of 91(2.2%), and 2out of 91(2.2%) respectively. The results of statistical analysis did not reveale significant differences with age, residence, educational levels, duration of pregnancy, previous of abortion and number of abortions on the prevalence of anti- herpes simplex type virus 2 IgM and IgG. The rate of susceptibility for herpes simplex virus type 2 infection among pregnant women was 89 (97.8%).

**Conclusion:** Low prevalence rate of HSV-2 seropositivity was appeared among pregnant women in studies area. However, it's necessary to focus on the women that demonstrated susceptibility for herpes simplex virus type 2 infection.

**Keyword:** HSV type 2, Anti-herpes simplex virus type 2 IgG, Anti- herpes simplex virus type 2 IgM, Pregnant women.

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## Introduction

Herpes simplex type 2 is members of the family herpesviridae the alpha-herpesvirinae subfamily of human herpesviruses together with varizella-zoster virus [1]. Herpes simplex virus type 2 (HSV-2) infection is one of the most common sexually transmitted and the major cause of genital infection worldwide, and can infect both male and female [2].

A primary symptomatic genital herpes infection is usually the most severe, especially in women. It causes blistering and ulceration of the external genitalia and cervix leading to vulval pain, dysuria, vaginal discharge and local lymphadenopathy [3]. Intra-uterine herpes simplex virus infection can cause significant morbidity and mortality in the developing fetus if the pregnant mother gets acute infection during pregnancy, the acquisition of genital herpes during pregnancy result in spontaneous abortion, stillbirth, intrauterine growth retardation, preterm labour, congenital and neonatal herpes infections [4,5]. Herpes simplex type 2 is transmitted by sexual contact and also from the infected mother to her fetus /newborn in utero, intapartum and postantally through the placenta and birth canal [6].

Epidemiology of genital herpes varies between different countries and between groups of individuals depending on the demographic and clinical characteristics. In recent years, the number of HSV-2 infections has markedly increased, from the late 1970s HSV-2 seroprevalence has increased by 30% resulting that one out of five adult infected [7]. Regarding pregnant population, there is a high prevalence of genital herpes, among pregnant women, HSV-2 seroprevalence rates between (6.2% - 24.4%) have been reported [8, 9]. Age and gender are important risk factors associated with the acquisition of

genital HSV-2 infection [10]. Thus this study aims to determine presence of anti-HSV-2 IgM, IgG among pregnant women and study the correlation with different parameters like age, gender, education levels, duration of pregnancy, previous of abortion and number of abortion.

## Material and methods

**Study locations and subjects:** Ninety one pregnant women were chosen from those attending the primary health care centers in Baquba - Diyala province, during 1<sup>st</sup> November / 2012 till 30<sup>th</sup> April / 2013. The age range between (15-37) years and the mean age was (25.10 ± 5.27) years. Information on age, month of pregnancy, residence, educational levels, was recorded by personal interview.

**Blood sampling and laboratory analysis:** Three ml of blood was drawn from pregnant women in plane plastic test tubes by vein punctures and separated by centrifugation at 3000 rotation / minute for 5 minutes, sera were stored frozen until the serological examination were performed on them.

Anti- herpes simplex type virus 2 IgG and IgM antibodies was detected by Enzym – Linked Immunosorbant Assay (Nova Tec immundiagnostica GmbH, Germany). The technique was performed according to the manufacturer's instructions. Positive or negative cases were determined by comparing the absorbance value of each sample in this study with that of the cut-off control value, samples with an absorbance value less than the cut-off value were considered as negative; samples with a value above the cut-off value were considered positive.

**Statistical analysis:** It was performed by using SAS version -11, and P - value of < 0.05 was considered significance.

## Results

Ninety one of healthy pregnant women were included in this study, the mean age was (25.10±5.27) years. The age range was (15-37) years. Twenty five (27.47%) of pregnant

women were from urban areas, while 66 (72.52%) were resided in rural areas. Seventy three (80.21%) of women with no previous abortion, table (1).

**Table (1):** Baseline data of pregnant women.

Variable	Frequency	Percent
<b>Age (years)</b>		
>20	12	13.18 %
20-29	59	64.63 %
30-40	20	21.97 %
<b>Residence</b>		
Urban	25	27.47 %
Rural	66	72.52 %
<b>Education</b>		
Illiterate & Primary	43	47.25 %
Preparatory & Secondary	7	7.69 %
University & higher	41	45.05 %
<b>Month of pregnancy</b>		
First trimester	16	17.58 %
Second trimester	33	36.26 %
Third trimester	42	46.15 %
<b>Abortion</b>		
No	73	80.21 %
Yes	18	19.78 %
<b>Number of abortion</b>		
NON	73	80.21 %
1	11	12.08 %
2	5	5.49 %
3>	2	2.19 %
<b>Total</b>	<b>91</b>	<b>100 %</b>

The results revealed that the rate of anti-herpes simplex type 2 IgG antibody among pregnant women was 2 out of 91(2.19%), while 89 out of 91(97.8%) were negative.

Additionally, 2 out of 91(2.19%) women were positive for anti-herpes simplex type 2 IgM antibody, while 89(97.8%) out of 91 were negative, table (2).



**Table (2):** Seroprevalence of anti-anti-herpes simplex type 2 IgG, IgM antibodies among pregnant women.

Pregnant women	IgM		IgG	
	Positive (%)	Negative(%)	Positive (%)	Negative (%)
	2(2.2%)	89(97.8%)	2(2.2%)	89(97.8%)
<b>Total</b>	91	100%	91	100%

The results also showed that all anti-herpes simplex type 2 IgM antibody positive women were belong to the age group 20-29 years, while the anti-herpes simplex type 2 IgG positive women were

belong to the age group 20-29 years and 30-40 years. The statistical analysis showed no significant differences in both cases, table (3).

**Table (3):** Anti- herpes simplex type 2 seropositivity according to age.

Age group (years)	IgM		Total (%)	IgG		Total (%)
	Negative (%)	Positive (%)		Negative (%)	Positive (%)	
➤ 20	12 (13.18)	0	12 (13.18)	12 (13.18)	0	12 (13.18)
20-29	57 (62.63)	2 (2.2)	59 (64.63)	58 (63.73)	1 (1.1)	59 (64.63)
30-40 +	20 (21.97)	0	20 (21.97)	19 (20.87)	1 (1.1)	20 (21.97)
<b>Total</b>	89 (97.8)	2 (2.2)	91 (100)	89 (97.8)	2 (2.2)	91 (100)
<b>P value</b>	➤ 0.05 [NS]			➤ 0.05 [NS]		

The results showed that all anti-herpes simplex type 2 IgM and IgG antibody positive women were belong to the rural area, however, no significant differences

regarding the distribution of anti- herpes simplex type 2 IgM and IgG positive women according to the area of residency, table (4).

**Table (4):** Anti- herpes simplex type 2 seropositivity according to residence.

residency	IgM		Total (%)	IgG		Total (%)
	Negative (%)	Positive (%)		Negative (%)	Positive (%)	
<b>Urban</b>	25 (27.47)	0	25 (27.47)	25 (27.47)	0	25 (27.47)
<b>Rural</b>	64 (70.32)	2 (2.2)	66 (72.52)	64 (70.32)	2 (2.2)	66 (72.52)
<b>Total</b>	89 (97.8)	2 (2.2)	91 (100)	89(97.8)	2 (2.2)	91 (100)
<b>P value</b>	➤ 0.05 [NS]			➤ 0.05 [NS]		

Similarly, there were no significant differences regarding the distribution of anti- herpes simplex type 2 IgG and IgM positive women according to the levels of

education, although in both cases, the positive women were belong to the primary and secondary levels of education, table (5).

**Table (5):** Anti- herpes simplex type 2 seropositivity according to educational level.

Education	IgM		Total (%)	IgG		Total (%)
	Negative (%)	Positive (%)		Negative (%)	Positive (%)	
<b>Illiterate &amp; Primary</b>	42 (46.15)	1 (1.1)	43 (47.25)	43 (47.25)	0	43 (47.25)
<b>Intermediate &amp; secondary</b>	7 (7.7)	0	7 (7.7)	7 (7.7)	0	7 (7.7)
<b>Higher</b>	40 (43.95)	1 (1.1)	41 (45.05)	39 (42.850)	2 (2.2)	41 (45.05)
<b>Total</b>	89 (97.8)	2(2.2)	91(100)	89 (97.8)	2(2.2)	91 (100)
<b>P value</b>	➤ 0.05 [NS]			➤ 0.05 [NS]		

Women were divided into three categories according to the duration of pregnancy, first trimester, second trimester and third trimester. The results

revealed that there were no significant differences among anti- herpes simplex type 2 IgM and IgG positive women with the duration of pregnancy, table (6).

**Table (6):** Anti- herpes simplex type 2 seropositivity according to duration of pregnancy.

Duration of pregnancy	IgM		Total (%)	IgG		Total (%)
	Negative (%)	Positive (%)		Negative (%)	Positive (%)	
<b>1<sup>st</sup>. trimester</b>	15 (16.48%)	1 (1.1%)	16 (17.58%)	16 (17.58%)	0	16 (17.58%)
<b>2<sup>nd</sup>. trimester</b>	32 (35.16%)	1 (1.1)	33 (36.26%)	32 (35.16%)	1 (1.1)	33 (36.26%)
<b>3<sup>rd</sup>. trimester</b>	42 (46.15%)	0	42 (46.15%)	41 (46.15%)	1 (1.1%)	42 (46.15%)
<b>Total</b>	89 (97.8)	2 (2.2)	91(100)	89 (97.8)	2 (2.2)	91 (100)
<b>P value</b>	➤ 0.05 [NS]			➤ 0.05 [NS]		

Statistical analysis did not reveal significant difference between the anti-herpes simplex type 2 IgM and IgG

positivity rates and the previous abortions as show in table (7).

**Table (7):** Anti- herpes simplex type 2 seropositivity according to previous abortions.

Previous abortions	IgM		Total (%)	IgG		Total (%)
	Negative (%)	Positive (%)		Negative (%)	Positive (%)	
With previous abortions	18 (19.78)	0	18 (19.78)	17 (18.68)	1 (1.1)	18 (19.78)
Without previous abortions	71 (78.02)	2 (2.2)	73 (80.21)	72 (79.12)	1 (1.1)	73 (80.21)
<b>Total</b>	89 (97.8)	2 (2.2)	91 (100)	89(97.8)	2 (2.2)	91 (100)
<b>P value</b>	➤ 0.05 [NS]		➤ 0.05 [NS]			

Furthermore, there was no relationship between the number of abortions and the positivity rate of anti- herpes simplex type 2 IgM and IgG antibodies, table (8).

**Table (8):** Anti- herpes simplex type 2 seropositivity according to number of abortions.

No. abortions	IgM		Total (%)	IgG		Total (%)
	Negative (%)	Positive (%)		Negative (%)	Positive (%)	
Non	71 (78.02)	2 (2.2)	73 (80.21)	72 (79.12)	1 (1.1)	73 (80.21)
1-2	16 (17.58)	0	16 (17.58)	15 (16.48)	1 (1.1)	16 (17.58)
3-4	2 (2.2)	0	2 (2.2)	2 (2.2)	0	2 (2.2)
<b>Total</b>	89 (97.8)	2 (2.2)	91(100)	89 (97.8)	2 (2.2)	91 (100)
<b>P value</b>	➤ 0.05 [NS]			➤ 0.05 [NS]		

## Discussion

Herpes simplex type 2 infection in pregnant women can result in abortion, premature labor and congenital and neonatal herpes. Herpes simplex type 2 infection in the newborn are particularly severe and frequently involve the CNS, one of the priorities of the disease control program is to provide accurate epidemiologic data through seroprevalence studies [5].

The present study found that the anti-herpes simplex type-2 IgM in healthy pregnant women in Diyala province was 2.2%. Upon reviewing the literature, different studies had presented different

results; in Saudi Arabia, (0.5%) of pregnant women had detectable level of HSV-2 IgM antibodies [11]. In Turkey, anti- HSV-2 IgM antibodies were found in 11.3% of 130 pregnant women [12]. The present study showed inconsistent with other Iraq researcher (Al-Marziqi *et al.*, [13]. Who reported that 28.9% of pregnant women were positive for anti-HSV-2 IgM antibodies. Furthermore, the results showed that the seroprevalence of HSV-2 infection dose not significantly associated with age, residency, level of education, duration of pregnancy, previous abortion and number of abortions. These results are consistent with certain



studies [14], and inconsistent with other studies [13].

In this study, seroprevalence of anti- HSV-2 IgG antibodies among pregnant women was 2.2%. In comparison to other National and International studies. Our finding was relatively low, the present results were inconsistent with results of other researcher, Al-Marziqi *et al.*, [13]. Who reported seroprevalence rate of (22.2%), another studies reported different results, for instance, in Saudi Arabia two separate studies found that the seropositivity of anti-HSV-2 IgM among pregnant women was (27.1% , 6.5%) respectively [15 , 11], Rathore *et al.*, reported that (7.5%) of Indian pregnant women were positive for anti-HSV-2 IgG antibodies[7] another study in northeast India, found that the seropositivity rate of anti-HSV-2 IgG among pregnant women was 8.7% [16].

Duran *et al.*, and Shaharki *et al.*, reported in separate studies a high proportion of pregnant Turkish women are infected with virus, (63.1% , 43.57%) receptivity. The present study found that none of the demographic factors age, residence, educational levels, duration of pregnancy, previous of abortion and number of abortions has significant influence on the IgG positivity rate, these results are inconsistent with certain studies [7 , 16 , 18].

According to the nature of HSV-2 transmission, the conservative nature of society, i.e. , moral principle that followed in the Iraqi population may be the reason behind its low prevalence, this reason, is supported by several studies that had conducted in Northeast Indian, which showed that HSV-2 seropositivity was higher among Christians (12.6%) compared to Muslims (3.8%) [16]. Also, because of a higher prevalence of promiscuous sexual behavior, large number of sexual partners

and high prevalence of other sexually transmitted infections, a much higher HVS-2 positivity has been reported in rural and urban of Africa (60-90%) and South and North America (30-70%) [19,20]. Furthermore, there's no vaccination programs to immune the susceptible pregnant women. In conclusion, the present results show that a low prevalence rate of HSV-2 seropositivity was appeared among pregnant women in Diyala province.

## References

- [1] TjØtta, E and Hoddevik G Herpes simplex virus (HSV1 and HAV2). in: A particle guide to clinical virology. Haahem, L. R.; Patton, J. R. and Whitley, R. J. ed. 2<sup>nd</sup> Ed. John Wiley and sons, Ltd 2002. p:127-134.
- [2] Straface, G, Selmin A, Zanardo V, Desantis M, Ercoli A, Scambia, G. Herpes simplex virus infection in pregnancy. *Infect. Dis. Obst. Gynecol.* 2012; 6(1): 1-6.
- [3] Greenwood D, Stack R C B and Peuterer J F Herpes simplex virus. in: Medical microbiology. Greenwood, D, Stack, R C B and Peuterer, J F (eds). 16<sup>th</sup> Ed 2002. Elsevier science limited. P: 401 – 407.
- [4] Apurba, SS, Sandhya BK, Senthamarai, S, Sivasankari S, Kumudavathi, MS, *et al.* Serological Evaluation of Herpes Simplex Virus Type- 1/ Type- 2 Infections in Pregnant Women with Bad Obstetric History in a Tertiary Care Hospital, Kanchipuram. *IJAR.* 2013;1(3): 123-8.
- [5] Kimberlin, D W. Herpes simplex virus infections of the newborn. *Semin Perinatol* 2011; 31:19-25.
- [6] Malm, G. Neonatal herpes simplex virus infection. *Semin Fetal Neonatal. Med.* 2009; 14: 204-8.
- [7] Rathore, S, Jawmal A and Gupta V. Herpes simplex virus type -2: seroprevalence in antenatal women. *Indian. J Sex Transm. Dis.* 2010; 31(1):11-15.

- [8] Xu, F, Markowitz L E, Gottlieb S L and Berman S M. Seroprevalence of herpes simplex virus type 1 and 2 in pregnant women in the United State *Am J Perinat. Med.* 2007; 36: 206-12 .
- [9] Arama, V. ; Vladareanu, R. ; Mihailescu, R. ; *et al.* Seroprevalence and risk factors associated with herpes simplex virus infection among pregnant women. *J. Perinat. med.* 2008; 36:206 – 12 .
- [10] Xu, F, sternbery M R, Kottiri B J, *et al.* Trends in herpes simplex virus type 1 and 2 seroprevalence in United states. *J Am Med Assoc.* 2006; 296: 964- 73 .
- [11] 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.
- [12] Duran, N, Yarkin F, Evruke C and Koksak F. Asymptomatic herpes simplex virus type-2 (HSV-2)infection among pregnant women in turkey. *Indian J Med Res.* 2004; 120:106-10.
- [13] Al-Marzoqi, A H M, Kadhim R A, Janabi, D K F, *et al.* Seroprevalnce study of IgG and IgM antibodies to toxoplasma, rubella, cytomegalovirus, *Chlamydia trachomatis* and herpes simples II in pregnancy women in Babylon province. *J. B. Agr Health.* 2012; 2(10): 159-64.
- [14] Alanen , A, Kahala K, vahlberg T, *et al.* Seroprevalence of prenatal infection and reliability of maternal history of varicella zoster virus, cytomegalovirus, herpes simplex virus and parvovirus B19 infection in south –western Finland. *Brit J Obest Gynecol.* 2005; 112(1):50-60.
- [15] 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.
- [16] Biswas, D. ; borkakoty, B. ; Mahanta, J. ; walia, K. ; Saikia, I. ; *et al.* Seroprevalence and risk factors of herpes simplex type-2 infection among pregnant women in northeast India. *BMC Infec. Dis.* 2011; 11(325).
- [17] Shahraki, A D, Moghim S and Akbari P A survey on herpes simplex type-2 antibody among pregnant women in Isfahan, Iran *J Res Med Sci.* 2010; 15(4): 243.
- [18] Obeid, O E. Prevalence of herpes simplex virus type’s 1and type 2 and association sociodemographic variables in pregnant women attending king Fahad hospital of the University. *Saudi. Doc. Family. Commun.* 2004; 22(4).
- [19] Fleming, D T, McQuillan G M, Johnson, R E, Nahmias A J, Aral S O ; *et al.* Herpes simplex virus type 2 in the United States, 1976 to 1994. *N Engl J Med* (1997). 337:1105–11.
- [20] Mihret, W, Rinke de Wit T F, Petros B *et al.* Herpes simplex virus type 2 seropositivity among urban adults in Africa: results from two cross-sectional surveys in Addis Ababa, Ethiopia. *Sex Transm Dis.* 2002; 29(3):175-81.