Thi-Qar Medical Journal (TQMJ):Vol.(26),No.(2),2023

Web Site: https://jmed.utq.edu Email: utjmed@utq.edu.iq

ISSN (Print):1992-9218

Immunological Study of Helicobacter Pylori Infections on Pregnancy With Gestational Diabetes Mellitus

Hajar Dawood salman AL-Shujiri[1];
Dr. Ifad Kerim Abd Al-shibly[2];
Dr. Huda H. Al-Hasnawy[3]
[1] Department of Microbiology, College of Medicine, University of Babylon, Iraq
Email: hajards1997@gmail.com
[2] University of Babylon, College of medicine, Department of microbiology
Email: ifad_shibly@uobabylon.edu.iq
[3] University of Babylon, College of medicine, Department of microbiology
Email: Hudaalhassnawi@uobabylon.edu.iq

Abstract

Background: The term "gestational diabetes mellitus" (GDM) refers to any degree of glucose intolerance that manifests itself or is first noticed during pregnancy. is a severe obstetric complication that affects between 5 and 10 percent of pregnancies globally; and is characterized by an insufficient response to insulin (Hyperglycemia). to make up for pregnancy's insulin-resistant condition. Gram-negative, spiral-shaped, microaerophilic H. pylori bacteria.Having dimensions of 0.5 to 1 pm in width and 2 to 4 pm in length. The body contains 2 to 6 flagella, and the flagella's motility grants and permits quick movement in viscous solutions, like the mucus layer of the gastric epithelial cell.

Objective: The purpose of this study was to determine the relationship between [Helicobacter pylori (H. pylori) with Gestational diabetes mellitus (GDM)].

Materials and Method: HP-IgG and HP-IgM levels were evaluated in 89 pregnancy womens: 60 with Gestational Diabetes Mellitus (GDM) disease and 29 with healthy pregnancy. The study participants and the healthy controls varied in ages from 23 to 47 year. The enzyme-linked immunosorbent assay (ELISA) method measured HP-IgG and HP-IgM levels in the blood.

Results: The serum HP-IgG was greater in GDM patients than in controls (p 0.01) and HP-IgM (p 0.05). the current study discovered a Positive association between HP-IgG and HP-IgM with GDM.

Conclusion: H. pylori infections are very common in GDM. The women with GDM, infections with H. pylori are rise the risks of GDM. The H. pylori selection and extermination therapy before pregnancy help in avoiding GDM

Keywords: Gestational Diabetes Mellitus (GDM), H. Pylori.

Introduction

Pregnancy-related Gestational Diabetes Mellitus (GDM) are serious condition, which pose a threat to the safety of both pregnant women and fetuses. small head circumference and low birth weight, and short body length birth are all signs of poor fetal development[1]. have been linked to neonatal deaths. However, there is still much to learn about the pathogenesis and etiology of gestational diabetes[1]. The etiology, pathogenesis, and poor fetal development of pregnancy-related complications may be influenced by infection and 'gestational diabetes mellitus' (GDM) [2].

The gram-negative bacterium Helicobacter pylori (H. pylori) has a particular affinity for 'stomach mucosa'. It has been identified as primary contributor to long-lasting gastric diseases[3]. The prevalence in H. pylori infection is nearly 50% worldwide, with developing nations having higher infection rate [4]. Estimates for 2021 indicate that '4.4 billion peoples worldwide' have H. pylori infections[5]. Studies on H. pylori have become more thorough in recent years, and links between the bacteria and several extragastric disease need slowly been reporteds [6]. including conditions that are linked to pregnancy, like [HG, PE, fetal growth restriction , early delivery, abortion, and fetal malformation] [7]. Unique of group most vulnerable to H. pylori infection is pregnant women, according to systematic review by Azami et al., 46% of pregnant women worldwide have the infection[8].

['Gestational diabetes mellitus' (GDM)] and prepregnancy diabetes mellitus are both referred toward as diabetes in pregnancy (DIP). Data from the United States show that DIP incidence was (7%, with GDM accounting for 86% of DIP cases) [9]. DIP can expressively increase the danger of undesirable pregnancy outcomes as a result of inadequate blood glucose management before and during pregnancy[10] , like [miscarriage, stillbirth, early delivery, small birth weight, macrosomia, and neonatal demise]. Consequently, presents a thoughtful public health problem for the entire worlds [9,10]. has not hitherto been determined whether needing the dual risks High blood glucose and H. pylori infection increase the likelihood of pregnancy related complication. illnesses and suboptimal fetal growth in GDM patients. Furthermore, it is not known if H. pylori testing and treatment are required prior to conception. [11]. This prospective study was created to investigate relationship between GDM and H. pylori infections.

Study design

Cross-sectional study design.

Patients and control

Eighty-nine pregnancy womens participated in the current research. Sixty pregnancy with GDM (diagnosed using standard clinical, Oral gloucose tolerance test, Fasting blood sugar, HbA1c, C-reactive protein, lymphocyte count and neutrophil count) participated in the research; a complete medical history was taken from each participant, including their (Age, BMI, Family history of DM, Family history of GDM and physical activity).Twenty-nine healthy pregnant make up the second group (control group).

The study exclution criteria include: Non-pregnancy, acute or chronic inflammatory illness, severe disease (such as heart failure, renal insufficiency, liver damage, or type-I,II diabetes), or other related malignancies. These categories range in age from 23 to 47 year. The statistical analysis was performed using SPSS version 20. In the case of all findings displayed as Mean SD, P values below 0.05 indicate statistical significance.

Chemicals and methods

1- Using a sandwich ELIZA kit to measure the blood's HP-IgG and HP-IgM levels. A micro-ELIZA plate specialized for HP-IgG and HP-IgM was pre-coated in this kit (Bioassay Technology Laboratory, ELIZA kit).

2- Using colorimetric test for determined Oral gloucose tolerance test, Fasting blood sugar based on the Spectrophotometers device. But lymphocyte count and neutrophil count by CBC.

Ethical issues

According to the native ethics group, these studies were approved, and all patients who participated gave informed consent and provided information about the study's goal.

Results

The study groups consist of 89 Pregnancy womens designated into two categories:

1- Pregnancy have Gestational diabetes mellitus (n=60)
2- Pregnancy as the control group (n=29)

Age

Table 1 shows high statistically significant difference in mean age between the ‘control group and the group with Gestational Diabetes Mellitus (GDM)’. The Patient with Gestational Diabetes Mellitus showed the following age distributions in terms of frequency: Figure 1 shows the Age of studied groups.

Table-1: The Age of studied groups.

	Control (n=29) Means ±SD	GDM patients (n=60) Means ±SD	P value
Age (Years)	28.45 ±1.16	34.83 ±0.80	P≤0.01
Range	23-45	25-47	

SD: standard deviation; high-significant at (P≤0.01)

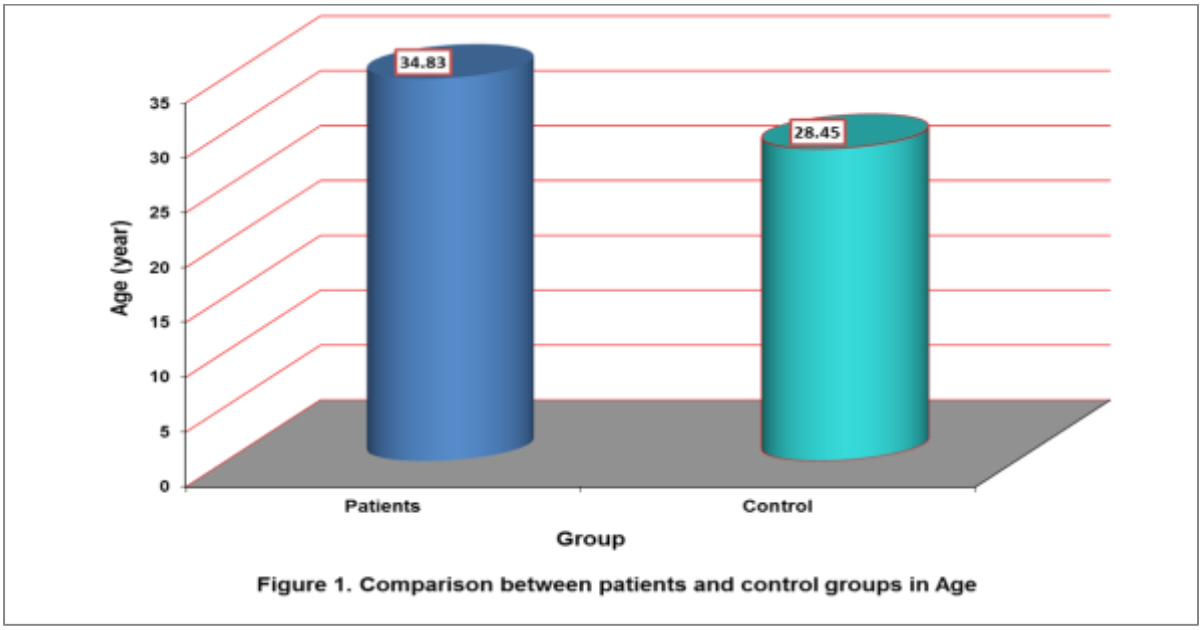

Figure -1: The frequency distribution of GDM patients according to age.

Body mass index (BMI).

Table-2 and Figure-2 reveal that Patients pregnancy were highly to have Gestational Diabetes Mellitus than control pregnancy were; the research included 60 patients with Gestational Diabetes Mellitus, 29 control without GDM.

Table -2: Distribution of BMI according to the studied group

BMI	Control (n=29)	GDM patients (n=60)
(kg/m^2)	26.38 ±1.13	37.67 ±0.70
P-value	P≤0.05	

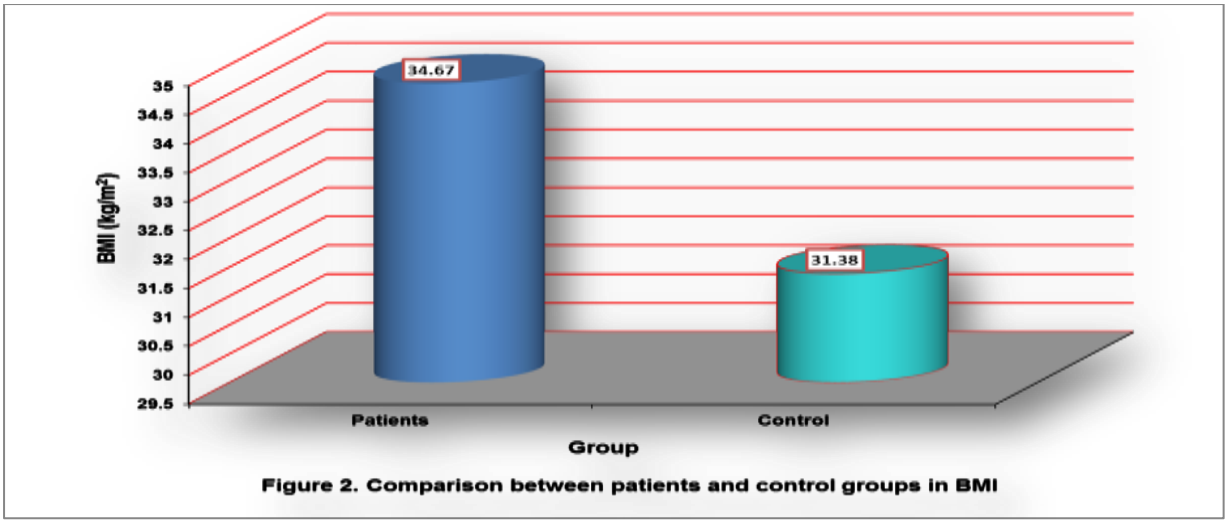

Figure-2:The frequency distribution of GDM patients according to BMI.

FBS , OGTT, HbA1c, Lymphocyte and Neutrophil

Table 3 shows high statistically significant difference in mean Fasting blood sugar (FBS) , oral glucose tolerance test (OGTT) , hemoglubine A1c (HbA1c), Lymphocyte and Neutrophil between the control group and the group with Gestational Diabetes Mellitus (GDM). Patients with Gestational Diabetes Mellitus showed the following age distributions in terms of frequency: Figures shows the FBS, OGTT, HbA1c, Lymphocyte and Neutrophil of studied groups.

Table -3: Distribution of FBS , OGTT, HbA1c, Lymphocyte and Neutrophil according to the studied group

Group	Mean ± SE				
	FBS (Mg/Dl)	OGTT (Mg/Dl)	HbA1c (%)	Lymphocyte (%	Neutrophil (%)
Patients	132.60 ±3.52	208.78 ±5.96	7.41 ±0.06	34.43 ±1.09	61.60 ±1.15
Control	66.31 ±1.86	85.68 ±1.26	4.45 ±0.08	27.45 ±1.15	59.24 ±0.83
T-test	10.417 **	17.196 **	0.223 **	3.505 **	3.489 NS
P-value	0.0001	0.0001	0.0001	0.0002	0.182
** (P≤0.01).					

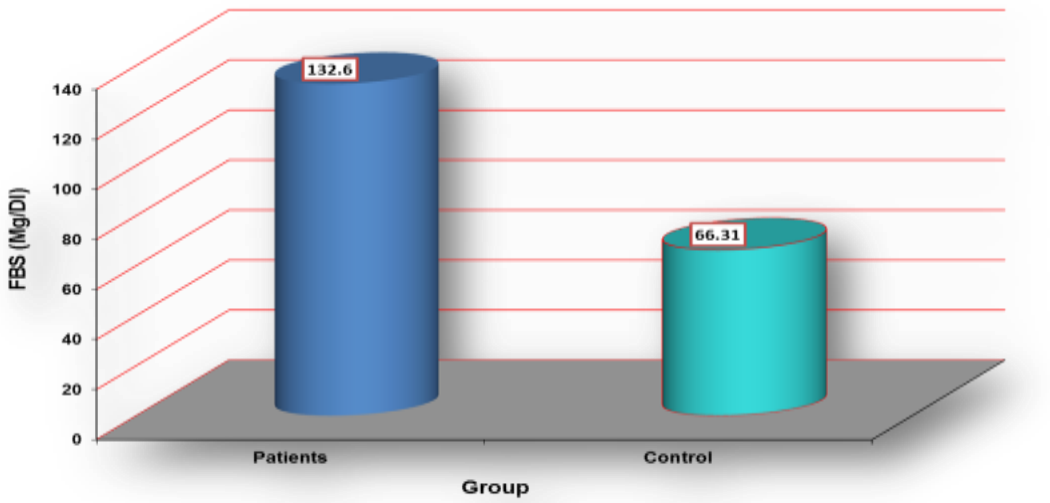

Figure 3. Comparison between patients and control groups in FBS

Figure-3:The frequency distribution of GDM patients according to FBS.

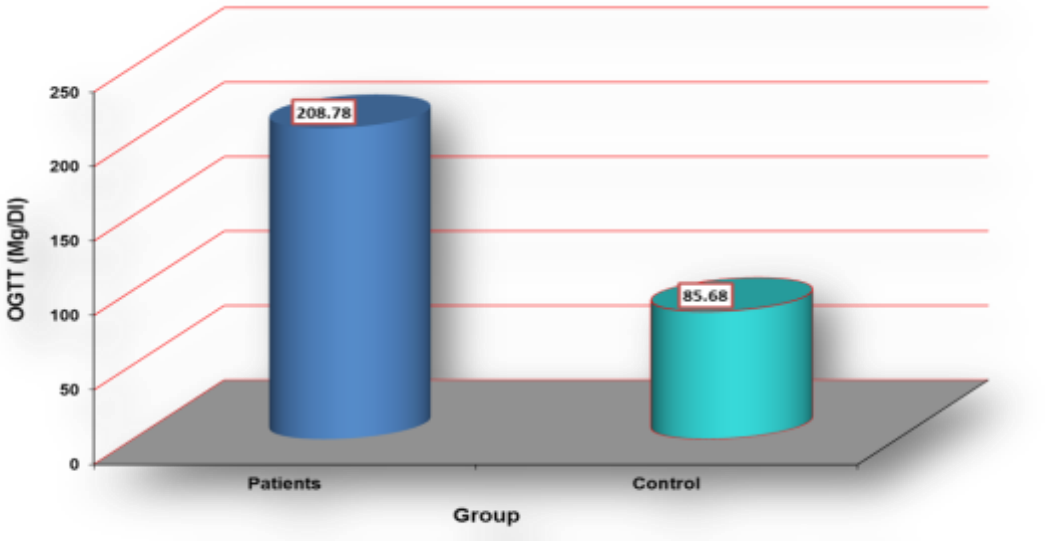

Figure 4. Comparison between patients and control groups in OGTT

Figure-4:The frequency distribution of GDM patients according to OGTT.

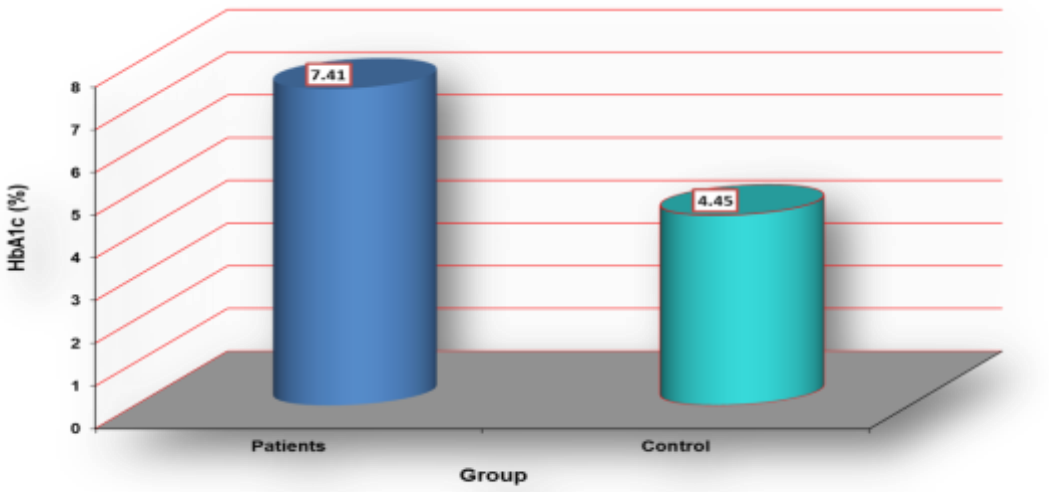

Figure 5. Comparison between patients and control groups in HbA1c

Figure-5:The frequency distribution of GDM patients according to HbA1c.

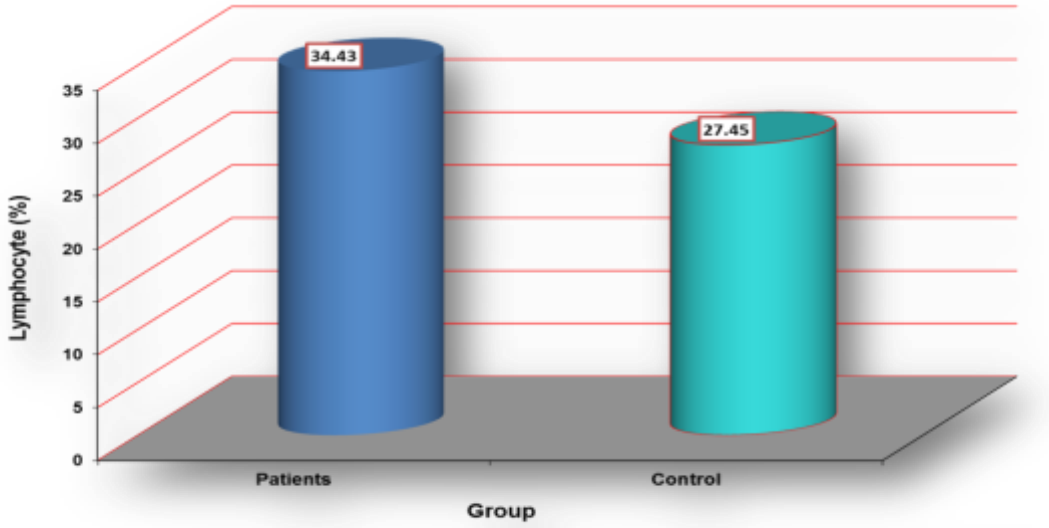

Figure 6. Comparison between patients and control groups in Lymphocyte (%)

Figure-6:The frequency distribution of GDM patients according to lymphocyte.

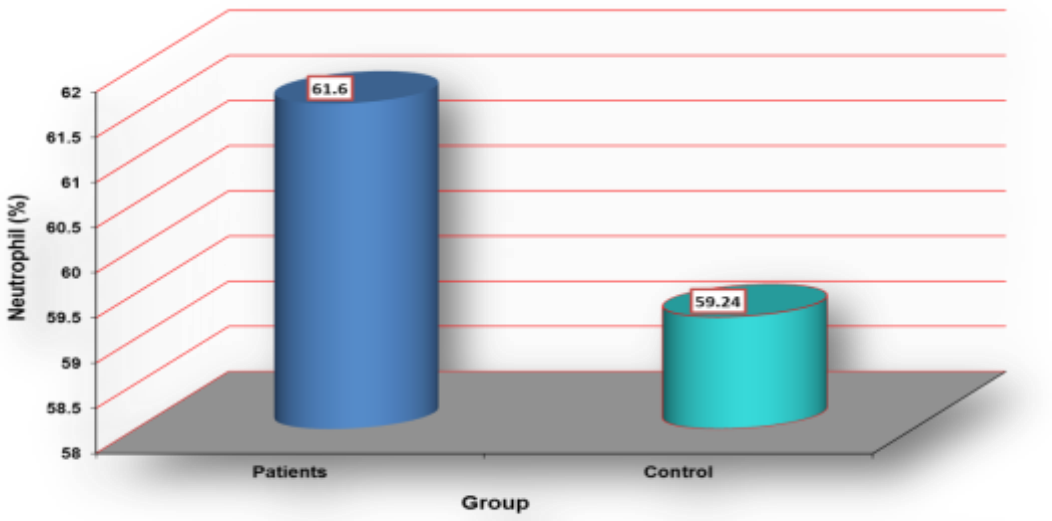

Figure 7. Comparison between patients and control groups in Neutrophil (%)

Figure-7:The frequency distribution of GDM patients according to Neutrophil.

C- reactive protein (CRP)

Table-4 reveal that Patients pregnancy were highly to have Gestational Diabetes Mellitus than control pregnancy were; the research included 60 patients with Gestational Diabetes Mellitus, 29 control without GDM.

Table -4: Distribution of CRP according to the studied group

Factor		Patients (No=60)	Control (No= 29)	P-value
CRP: No (%)	Positive	46 (76.67%)	3 (10.34%)	0.0001 **
	Negative	14 (23.33%)	26 (89.66%)	0.041 *
	P-value	0.0001 **	0.0001 **	---
* (P≤0.05), ** (P≤0.01).				

Association of IgG and IgM level with gestational diabetes mellitus patients.

Mean differences between GDM patients and controls are seen in Table 3, with GDM patients having IgG (10.00%) and IgM (21.67%) concentrations in patient group (GDM). but the control don't have gestational diabetes and bacterial infection . In the present

investigation found a significant (p-value 0.01) between IgG and IgM in GDM patients. That is indicator to the h. pylori infection rise during GDM.

Table-5: Distribution of sample study according to H. Pylori IgG Qualitative in patients and control

Factor		Patients (No=60)	Control (No= 29)	P-value
H.Pylori IgG Qualitative: No (%)	Positive	6 (10.00%)	0 (0.00%)	0.097 NS
	Negative	54 (90.00%)	29 (100%)	0.0063 **
	P-value	0.0001 **	0.0001 **	---
** (P≤0.01).				

Table-6: Distribution of sample study according to H. Pylori IgM Qualitative in patients and control.

Factor		Patients (No=60)	Control (No= 29)	P-value
H.Pylori IgM Qualitative: No (%)	Positive	13 (21.67%)	0 (0.00%)	0.0394 *
	Negative	47 (78.33%)	29 (100%)	0.0278 *
	P-value	0.0001 **	0.0001 **	---
* (P≤0.05), ** (P≤0.01).				

Discussion

Serological testing, breathalyzers, gastric mucosal biopsies, and other techniques are just a few of the ways Helicobacter pylori can be found. The IgG antibody might indicate an infection or previous exposure [12].The primary causes of this are that DM impairs immune and cellular processes and increases susceptibility to infection [13,14]. Additionally, it may weaken acid secretion and gastrointestinal peristalsis, which would encourage the colonization and the infections of pathogen in intestine. Pregnant women are more prone to H. pylori infection because of immune adaptation during pregnancy[15]. When DM complicates pregnancy, the risk of infection rises even more. Study the association between diabetes mellitus and unfavorable pregnancies results have generally produced similar findings. [16] . Maternal and fetal complications brought on by high blood sugar include spontaneous abortion, fetal abnormalities, a condition known as a stillbirth, macrosomia,

which neonatal low blood sugar, and hyperbilirubinemia of the newborn. These conditions can have a serious negative impact on the mother's and child's health. [17]. Obstructed fetal growth and pregnancy-related issues in DIP may be caused by infection, which may also contribute to their pathogenesis [18]. The increased occurrences of GDM in the pregnancy in the present research may have been caused in part by the high infection rate, particularly with H. pylori [19]. We followed by contrasting the IgG prevalence rates in each group [Patient and group][20]. The findings indicated that an the Infections with H. pylori might raise prevalence of pregnancy related GDM and impair fetal development [21]. The antibody IgM may be indicative of a present infection and H. pylori infection is particularly common in pregnant women with diabetes [22]. Infection about H. pylori may raise the risk of pregnancy-related illnesses in women with DIP [23]. 'H. pylori examination and elimination therapy' may aid avoid pregnancy illnesses and improve the growth of the fetus. [24]. GDM exacerbated the impact of the bacteria H.pylori on pregnancy-related illness and the growth of the fetus. [25].

Conclusion

H.Pylori infection are elevated during Gestational diabetes mellitus(GDM) , the level of IgG during H.Pylori infection refer to old infection but the level of IgM refer to recent infection .observe the level of IgM in present study higher than level of IgG in patients group .suggesting that found association between IgG, IgM and GDM.

References:

1. Olmos-Ortiz, A., Flores-Espinosa, P., Díaz, L., Velázquez, P., Ramírez-Isarraraz, C., & Zaga-Clavellina, V. (2021). Immunoendocrine dysregulation during gestational diabetes mellitus: the central role of the placenta. International Journal of Molecular Sciences, 22(15), 8087.
2. Ali, H., Hussam, F., Al-Zubaidi, S. H., Hameed, N. M., Shakir, A., & Adhab, Z. H. Gestational Diabetes among Pregnant Women during Pregnancy in Baghdad, Iraq.
3. Chmiela, M., & Kupcinskas, J. (2019). Pathogenesis of Helicobacter pylori infection. Helicobacter, 24, e12638.
4. Li, Y., Lv, T., He, C., Wang, H., Cram, D. S., Zhou, L., ... & Jiang, W. (2020). Evaluation of multiplex ARMS-PCR for detection of Helicobacter pylori mutations conferring resistance to clarithromycin and levofloxacin. Gut Pathogens, 12(1), 1-12.
5. Johnson, K. S., & Ottemann, K. M. (2018). Colonization, localization, and inflammation: the roles of H. pylori chemotaxis in vivo. Current opinion in microbiology, 41, 51-57.
6. Cen, L., Pan, J., Zhou, B., Yu, C., Li, Y., Chen, W., & Shen, Z. (2018). Helicobacter Pylori infection of the gallbladder and the risk of chronic cholecystitis and cholelithiasis: A systematic review and meta-analysis. Helicobacter, 23(1), e12457.
7. Mezmale, L., Coelho, L. G., Bordin, D., & Leja, M. (2020). Epidemiology of Helicobacter pylori. Helicobacter, 25, e12734.
8. Dixit, P., & Bhattacharyya, A. (2022). Understanding phosphorylation-mediated changes in the Subcellular localization and function of siah2 protein in the context of Helicobacter pylori-mediated gastric cancer (Doctoral dissertation, School of Biological Sciences, NISER, Bhubaneswar).
9. Care, D. (2019). Care in Diabetesd2019. Diabetes care, 42(1), S13-S28.

10. Smith, S., Fowora, M., & Pellicano, R. (2019). Infections with Helicobacter pylori and challenges encountered in Africa. World journal of gastroenterology, 25(25), 3183.
11. Szmuilowicz, E. D., Josefson, J. L., & Metzger, B. E. (2019). Gestational diabetes mellitus. Endocrinology and Metabolism Clinics, 48(3), 479-493.
12. Godbole, G., Mégraud, F., & Bessède, E. (2020). Diagnosis of Helicobacter pylori infection. Helicobacter, 25, e12735.
13. Mekonnen, D., Mengist, H. M., Derbie, A., Nibret, E., Munshea, A., He, H., ... & Jin, T. (2021). Diagnostic accuracy of serological tests and kinetics of severe acute respiratory syndrome coronavirus 2 antibody: A systematic review and meta-analysis. Reviews in medical virology, 31(3), e2181.
14. Wensveen, T. T., Gašparini, D., Rahelić, D., & Wensveen, F. M. (2021). Type 2 diabetes and viral infection; cause and effect of disease. diabetes research and clinical practice, 172, 108637.
15. Siddiqui, R., Mungroo, M. R., Alharbi, A. M., Alfahemi, H., & Khan, N. A. (2022). The Use of Gut Microbial Modulation Strategies as Interventional Strategies for Ageing. Microorganisms, 10(9), 1869
16. Joo, E. H., Kim, Y. R., Kim, N., Jung, J. E., Han, S. H., & Cho, H. Y. (2021). Effect of endogenic and exogenic oxidative stress triggers on adverse pregnancy outcomes: preeclampsia, fetal growth restriction, gestational diabetes mellitus and preterm birth. International Journal of Molecular Sciences, 22(18), 10122.
17. Silva, C. M., Arnegard, M. E., & Maric-Bilkan, C. (2021). Dysglycemia in pregnancy and maternal/fetal outcomes. Journal of Women's Health, 30(2), 187-193.
18. Li, J., Fan, M., Ma, F., Zhang, S., & Li, Q. (2021). The effects of Helicobacter pylori infection on pregnancy-related diseases and fetal development in diabetes in pregnancy. Annals of Translational Medicine, 9(8).
19. Tang, Y., Yang, Y., & Lv, Z. (2021). Adverse pregnancy outcomes and Helicobacter pylori infection: A meta-analysis. International Journal of Clinical Practice, 75(10), e14588.
20. Feng, C., Lv, P. P., Huang, C. C., Yang, S. Q., Yao, Q. P., Shen, J. M., & Jin, M. (2020). Sperm parameters and anti-Müllerian hormone remain stable with Helicobacter pylori infection: a cross-sectional study. BMC urology, 20(1), 1-9.
21. Xia, B., Wang, W., Lu, Y., & Chen, C. (2020). Helicobacter pylori infection increases the risk of metabolic syndrome in pregnancy: a cohort study. Annals of Translational Medicine, 8(14).
22. Ansari, S., & Yamaoka, Y. (2022). Helicobacter Pylori Infection, Its Laboratory Diagnosis, and Antimicrobial Resistance: A Perspective of Clinical Relevance. Clinical Microbiology Reviews, 35(3), e00258-21.
23. Shedid, A. A. A., & Mourad, A. W. A. (2018). Obesity, Helicobacter pylori Infection and Preeclampsia: A triangle of Danger for pregnant women Running title: Helicobacter pylori Infection and Preeclampsia. The Egyptian Journal of Fertility of Sterility, 22(2), 44-52.
24. Cardaropoli, S., Rolfo, A., & Todros, T. (2014). Helicobacter pylori and pregnancy-related disorders. World Journal of Gastroenterology: WJG, 20(3), 654.
25. Lai, F. P., Tu, Y. F., Sheu, B. S., & Yang, Y. J. (2019). Maternal H. pylori seropositivity is associated with gestational hypertension but is irrelevant to fetal growth and development in early childhood. BMC pediatrics, 19, 1-9.