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Helicobacter Pylori and the Severity of Preeclampsia

Obstetrics & Gynecology

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ABSTRACT

Background: The main cause of maternal morbidity and mortality, intrauterine growth retardation, as well as fetal prematurity, is pre-eclampsia. Helicobacter pylori was found to infect several parts of the stomach and duodenum and has consequently been linked to a higher risk of gastric cancer. Pre-eclampsia is more frequent in women infected with H. pylori than in women who are not.

Aim of the work: To assess the relation between severity of pre-eclampsia and of Helicobacter pylori infection.

Patients and methods: This case-control research involved 100 pregnant women at the Obstetrics and Gynecology Departments of Al-Azhar Hospital and Mansoura International Hospital, with 50 healthy, normal pregnant women in group A (the control group) and 50 cases diagnosed with pre-eclampsia in group B (the case group). All participants underwent the taking of history, a complete general examination, an obstetric examination, and laboratory investigations. A serological diagnosis of H. pylori infection has been made utilizing anti-H. Pylori IgG detection.

Results: In the preeclampsia group, H. pylori was statistically significantly higher. The frequency of IUGR, maternal ICU admission, and neonatal ICU admission among the preeclampsia group has increased statistically significantly. There have been statistically significant positive connections across HP positivity and elevation in SBP/DBP as well as the degree of proteinuria among the pre-eclampsia group. There has been a statistically significant increase in IUGR incidence and maternal ICU admission among pre-eclampsia cases who tested positive for HP infection.

Conclusion: Study suggess that HP infection impairs the process of placentation and thus is a risk factor for PE incidence.

Keywords: *Preeclampsia; helicobacter pylori.*

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Authorship: *All authors have a substantial contribution to the article.*

INTRODUCTION

Preeclampsia is the most common reason for maternal morbidity and death, as well as IUGR and prematurity of the fetus. Preeclampsia impacts 5-10% of pregnancies and manifests clinically after 20 weeks of pregnancy [1].

Preeclampsia is a prominent cause of maternal death and morbidity, accounting for 30–35% of preterm deliveries. Even though the etiology of preeclampsia is unknown, endocrine dysregulation is thought to play a role in the disease's pathogenesis. As a result, exposure of the mother to endocrine disrupting chemicals (EDCs) could be a risk factor for pre-eclampsia [2].

The reality that preeclampsia is related to increased maternal circulating cytokines, particularly TNF-α, IL-6a, IL-10, and IFN-γ, lends evidence to the systematic inflammation role. There is increasing proof that various infectious factors, like periodontal disease, urogenital infections, as well as parasitic infections, are involved in the syndrome's pathogenesis [3].

H. pylori is a Gram-negative bacterium with a helical structure that was found to infect numerous parts of the stomach and duodenum and has therefore been connected to an increased risk of gastric cancer. This infection affects developing and popular countries more than others. Infection with H. Pylori is widespread worldwide, with rates ranging from 20%-50% in developed countries and up to 80% in impoverished ones [4].

H. Pylori is an infectious pathogen connected to a variety of pregnancy-related complications, such as hyperemesis gravidarum and iron deficiency anemia. It's believed that 46% of pregnancies include it. The 120-145 kDa protein cytotoxin-associated gene A

(CagA) has previously been connected to gastric cancer development [5].

Di Simone et al. [6] discovered a probable link between infection with H. Pylori and anti-CagA antibody positivity and the severity of pre-eclampsia clinical presentation, implying that H. Pylori infection may affect placental growth and increase the chance of developing pre-eclampsia.

According to Shiadeh et al. [7], H. pylori-infected women are more likely to develop pre-eclampsia than non-infected women. Furthermore, infection with H. pylori Cag A positive strain can raise the risk of pre-eclampsia in pregnant women. According to Bellos et al. [8], infection with H. pylori can double the danger of having preeclampsia.

Could helicobacter pylori increase the severity of Pre-eclampsia or not.

PATIENTS AND METHODS

This case-control research involved 100 pregnant women recruited from the Obstetrics and Gynecology Departments of Al-Azhar Hospital and Mansoura International Hospital, divided into 2 groups:

Group A (control group): 50 healthy normal pregnant women.

Group B (case group): According to the 2013 ACOG recommendations, 50 cases were diagnosed with pre-eclampsia. Pre-eclampsia has been characterized as blood pressures greater than 140 mmHg systolic or greater than 90 mmHg diastolic after 22 weeks of pregnancy, accompanied by positive urine protein testing (300 mg/24h) [9].

Inclusion criteria: Age from 20 to 35 years old, singleton pregnancy, gestational age from 22 to 38 weeks, and a diagnosis of preeclampsia.

Exclusion criteria: A history of chronic high blood pressure, history of diabetes mellitus, gestational diabetes or known to be diabetic, history of renal disease, history of cardiovascular disease, history of autoimmune disease, history of multi fetal gestation, women with chromosomal abnormalities, history of specific medication, and pre-eclampsia subjects complicated with diabetes mellitus.

Methods

All patients included in the study signed an informed consent. Then, all participants underwent detailed history taking, a complete general examination, an obstetric examination, and laboratory investigations as: Complete urine analysis, blood hemoglobin, platelet count, serum creatinine and liver enzymes, obstetric ultrasound to confirm the gestational age, exclude the presence of low-lying placenta or fetal anomalies, and h. pylori infection was diagnosed by serology (anti-H. pylori IgG detection).

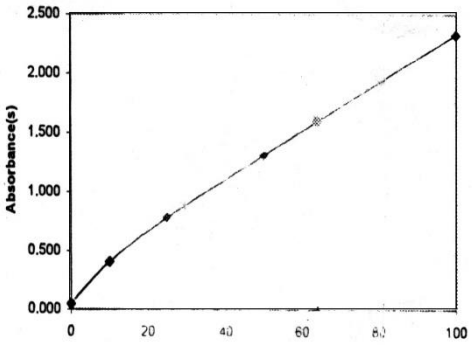

Fig. 1: Standard curve determine the level of H. pylori activity. In the curve the average absorbance of the duplicate for each unknown on the vertical axis of the graph plotted against the concentration (U/ml) in the horizontal axis.

RESULTS

Variable		Group I (Preeclampsia) (*n*=50)	Group II (Non-preeclampsia) (n=50)	t	P
Age: (years)	*Mean ±SD*	27.42±4.67	27.04±4.78	0.40	0.69
	Range	20-35	20-35		NS

Table 1: The study groups' ages.

This table reveals that there have been no statistically significant differences in mean age across the groups studied.

Variable		Group I (Preeclampsia) (*n*=50)	Group II (Non-preeclampsia (n=50)	t	P
SBP: (mmHg)	*Mean ±SD*	159.8±13.48	102.2±10.36	**22.08**	**<0.001****
	Range	140-200	90-120		
DBP: (mmHg)	*Mean ±SD*	110.8±8.04	75.4±5.43	**16.21**	**<0.001****
	Range	90-130	60-80		

Table 2: The study groups' blood pressure

This table reveals that both SBP and DBP have increased statistically significantly in the preeclampsia groups when compared to the non-preeclampsia groups.

Variable		Group I (Preeclampsia) (*n*=50)	Group II (Non preeclampsia) (n=50)	Test	P
Creatinine: (mg/dl)	*Mean ±SD*	0.75±0.28	0.61±0.19	**t**	
	Range	0.4-1.3	0.4-0.9	**2.85**	**0.005***
Hb: (gm/dl)	*Mean ±SD*	10.12±1.22	10.37±1.46	t	
	Range	7.6-12.5	7.4-13.7	0.93	0.36 NS
Platelets: ($x10^3/mm^3$)	*Mean ±SD*	165.84±61.21	189.06±67.7	MW	
	Median (Range)	159(52-294)	186.5(52-357)	1.7	0.09 NS
INR:	*Mean ±SD*	1.03±0.12	1.02±0.11	t	
	Range	0.9-1.3	0.9-1.3	0.53	0.60 NS
SGOT: (U/L)	*Mean ±SD*	37.74±23.5	30.12±19.94	MW	
	Median (Range)	28.5(14-96)	23(13-94)	1.95	0.05 NS
SGPT: (U/L)	*Mean ±SD*	54.82±31.83	46.12±28.84	MW	
	Median (Range)	41(18-143)	37(18-141)	1.59	0.11 NS

SD: Standard deviation: Independent t test MW: Mann Whitney test

NS: Non -significant (P>0.05) *: Significant (P<0.05)

Table 3: Laboratory findings of the studied groups.

This table reveals that the preeclampsia group had a statistically significant increase in creatinine when compared to the non-preeclampsia group. Other parameters did not show any difference between the two groups.

Variable		Group I (Preeclampsia) (*n*=50)	Group II (Non-preeclampsia) (n=50)	MW	P
H.pylori:	*Number%*	21 (42%)	14(28%)		
	Mean ±SD	1.07±0.5	0.85±0.28	**2.31**	**<0.02***
	Median	0.94	0.77		
	Range	0.43-2.7	0.44-1.66		

SD: Standard deviation MW: Mann Whitney test *: Significant (P<0.05)

Table 4: The study groups' Helicobacter Pylori titres.

This table reveals that the preeclampsia group had a statistically significant increase in H. pylori compared to the non-preeclampsia group.

Variable		Group I (Preeclampsia) (*n*=50)		Group II (Non-preeclampsia) (n=50)		t	P
Gestational age: (week)	*Mean ±SD*	34.18±2.73		37.7±1.98		**7.38**	**<0.001****
	Range	27-38		32-40			
Variable		**No**	**%**	**No**	**%**	**χ^2**	**P**
Mode:	*CS*	48	96	42	84	**4**	**<0.04***
	NVD	2	4	8	16		

SD: Standard deviation t: Independent t test χ2:Chi square test

*: Significant (p<0.05) **: Highly significant (P<0.001)

Table 5: Data on delivery in the groups studied.

This table reveals that the preeclampsia group had a statistically significant decrease in mean gestational age and NVD when compared to the non-preeclampsia group.

Variable		Group I (Preeclampsia) (*n*=50)		Group II (Non-preeclampsia) (n=50)		χ^2	P
		No	**%**	**No**	**%**		
IUGR:	*No*	32	64	44	88	**7.9**	**0.005***
	Yes	18	36	6	12		
NICU:	*No*	18	36	39	78	**17.99**	**<0.001****
	Yes	32	64	11	22		
Maternal ICU:	*No*	31	62	47	94	**14.92**	**<0.001****
	Yes	19	38	3	6		

χ2:Chi square test *: Significant (P<0.05) **: Highly Significant (P<0.001)

Table 6: Unfavorable out comes among the studied groups.

This table reveals that the frequency of IUGR, maternal ICU admission, and neonatal ICU admission has increased statistically significantly in the preeclampsia group compared to the non-preeclampsia group.

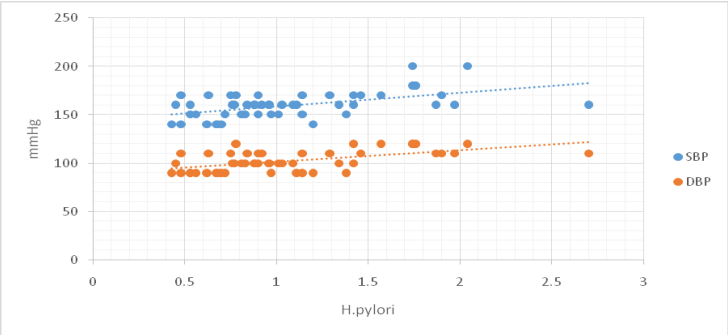

Fig. 2: Correlation between H. pylori and blood pressure among preeclampsia group.

This figure shows that there has been a statistically significant +ve correlation across H. pylori titre and SBP and DBP among the preeclampsia group.

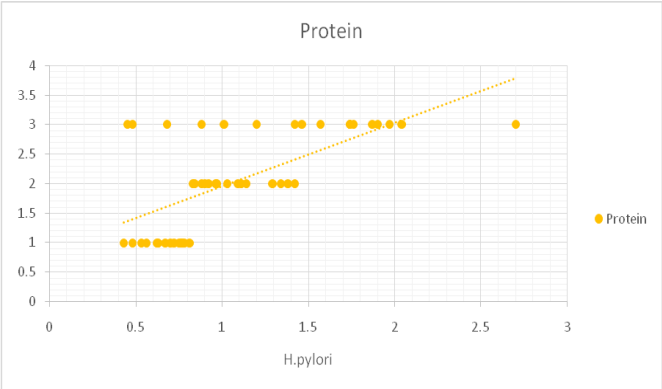

Fig. 3: Correlation between H. pylori and protein among preeclampsia group.

This figure shows that there has been a statistically significant +ve correlation across H. pylori titre and degree of proteinuria among the preeclampsia group.

Variable		N	H.pylori		MW	P
			Mean±SD	Median		
Mode:	*CS*	48	1.09±0.5	0.94	1.09	0.28
	NVD	2	0.7±0.38	0.7		NS
IUGR:	*No*	32	0.89±0.33	0.86	**3.25**	**0.001***
	Yes	18	1.41±0.57	1.36		
NICU:	*No*	18	0.88±0.32	0.86	1.83	0.07
	Yes	32	1.18±0.55	1.13		NS
Maternal ICU:	*No*	31	0.94±0.42	0.88	**2.23**	**0.03***
	Yes	19	1.29±0.55	1.14		

SD: Standard deviation MW: Mann Whitney test NS: Non significant (P>0.05)

*: Significant (P<0.05)

Table 7: Relation between H. pylori and mode of delivery and outcome among preeclampsia group.

This table reveals a statistically significant rise in H. pylori in preeclampsia cases that had IUGR compared to cases that hadn't and also among cases that had maternal ICU admission compared to cases that hadn't.

DISCUSSION

Preeclampsia affects 8% of all pregnancies. Eclampsia is a serious complication that can happen before, during, or after delivery and is linked to an increased risk of maternal mortality [10].

Preeclampsia is a multisystem condition with a complicated pathophysiology that is still being studied. Placental ischaemia and oxidative stress are hypothesized to be caused by insufficient trophoblast invasion as well as poor spiral artery remodeling. This mechanism stimulates the release of a variety of mediators into the maternal circulation, resulting in improved vasoreactivity and endothelial damage in general. The fact that preeclampsia is linked to increased maternal circulation cytokines, particularly TNF-α, IL-6a, IL-10, and IFN-γ, lends support to the function of systematic inflammation. Numerous infectious factors, including periodontal disease,

urogenital infections, as well as parasitic infections, have been linked to the syndrome's pathogenesis [7].

Helicobacter pylori represents an infection agent connected to a variety of pregnancy complications, which include iron-deficient anemia and hyperemesis gravidarum. It's predicted that it's found in 46% of pregnancies. CagA (cytotoxin-associated gene A) is a 120-145 kDa protein which has previously been connected to gastric cancer development. [5].

According to Franceschi et al. [11], anti-CagA antibodies cross-react with placental β-actin, in vitro, lowering the cytotrophoblast's invasiveness.

In spite of this latter result, various observational studies have looked into the link between H. pylori seropositivity and preeclampsia. Nevertheless, there is no experimental research in this field yet. As a result, it's unclear if H. pylori-infected women are more likely to have preeclampsia. Therefore, the present research has been undertaken to detect the severity of pre-eclampsia by serological examination of helicobacter pylori.

This case-control study included 100 pregnant women from the Obstetrics and Gynecology Departments of Al-Azhar Hospital and Mansoura International Hospital, who were separated into two groups:

Group A (control group): 50 healthy normal pregnant women.

Group B (case group): 50 cases diagnosed with pre-eclampsia.

All participants underwent the taking of history, a complete general examination, an obstetric examination and laboratory investigations (including complete urine analysis, blood hemoglobin, platelet count, serum creatinine, and liver enzymes). Obstetric ultrasound was done to confirm the gestational age and exclude the presence of low-lying placenta or fetal anomalies. The identification of anti-H. pylori IgG allowed for a serological diagnosis of H. pylori infection.

Our study found no statistically significant differences in mean age between the groups tested. But there was a statistically significant increase in both SBP and DBP among preeclampsia group compared to no preeclampsia group. In agreement with Di Simone et al. [(6)] also analyzed the relationship between Hp infection and anti-CagA antibody positivity and the severity of PE clinical presentation. They found no significant difference in terms of age.

Regarding degree of proteinuria, 30% of the studied cases had 1, 36% had 2 and 34% had 3. Also, researches as Di Simone et al. [6] also observed high levels of proteinuria in PE (*P*<.001).

In our study, the preeclampsia group had a statistically significant increase in creatinine when compared to the non-preeclampsia group. No differences were found among the two groups in the other laboratory parameters. According to Di Simone et al. [6] ,preeclamptic women had a significantly lower platelet count (*P*<.001).

Regarding delivery data, there was a statistically significant decrease in mean GA and NVD among preeclampsia group compared to no preeclampsia group. Also, our results show the sameDi Simone et al. [6] where he found lower GA at birth (P<.001) and lower neonatal birth weight (P<.001), as well as a greater frequency of SGA babies (P<.001) in preeclamptic women compared to controls.

Regarding helicobacter pylori titre, there has been a statistically significant rise in H. pylori in the preeclampsia group versus the no preeclampsia group. Also, Di Simone et al. [6,] observed that preeclamptic women (57.0%) had a greater seroprevalence of Hp infection than healthy pregnant women (33.3%) (P<.001). When seropositivity for CagA-positive Hp strains was examined (45.2% of women had PE versus 13.7% of controls; P<.001) the difference became even clearer.

Our study agrees with the previous study reported by Shiadeh et al. [7] assessed the potential relationship between H. pylori infection and pre-eclampsia (PE) and found that women infected with H. pylori are more prone to develop PE than non-infected women. Furthermore, infection with Cag A positive H. pylori strains may significantly raise the chance of PE in pregnant women.

According to our findings, there had been a statistically significant increase in the frequency of IUGR, maternal ICU admission, and neonatal ICU admission among the preeclampsia group versus the non-preeclampsia group .researchers like Shabana et al. [12] evaluated the relationship between H. pylori stool antigen (HPSA) and preeclampsia (PE) worsened by IUGR. They concluded that the HPSA test can detect an active gastrointestinal colonization and is more appropriate for the diagnosis and also for the follow-up of patients with H. pylori; they demonstrated a direct role for HPSA called catalase, which is a specific antigen in the feces of H. pylori-infected humans in the etiopathogenesis of PE with IUGR.

In the current study, there were statistically significant positive relationships between HP positivity and elevations in SBP/DBP as well as the degree of proteinuria among the pre-eclampsia group.

Moreover, there was a statistically significant increase in incidence of IUGR and maternal ICU admission among pre-eclampsia cases who tested positive to HP infection, compared to those who tested negative.

Our study had the same result as Di Simone et al. [6] showed that clinical characteristics of PE patients were associated with Hp infection or anti-CagA antibody. There have been no differences in gestational age at beginning, disease severity, umbilical artery Doppler velocimetry, growth of the fetus or maternal proteinuria levels, uric acid, platelets, or antithrombin III between participants with and without Hp infection and anti-CagA antibody. The abnormalities of uterine arteries by Doppler velocimetry (P<.001) represented as higher resistance index (RI) mean value (P<.001) were

observed to have a statistically significant connection with Hp infection and positivity for anti-CagA antibody. They showed a link between Hp infection and PE, as well as anomalous uterine artery Doppler velocimetry, implying that Hp infection has a role in compromising placental development and promoting the chance of developing PE.in agreement with Bellos et al. [8] found that the existence of IUGR in preeclamptic pregnancies was significantly related to a higher incidence of H. pylori IgG antibodies, supporting the theory that H. pylori infection doubles the chance of having preeclampsia.

Anti-H. Pylori IgG serology testing is a non-invasive diagnostic approach that is unaffected by H. pylori infection-suppressing medicines like proton pump inhibitors and antibiotics. However, because false positive findings might happen following effective eradication therapy, its reliability differs greatly between studies. The HPSA assay is a very effective assay that can accurately differentiate between active and previous infections [13] . The findings of our study suggest a possible role of *H. pylori* infection in preeclampsia development.

Increased oxidative stress is linked to H. pylori infection, as it stimulates the production of reactive oxygen species and the depletion of antioxidant molecules like NO and glutathione. CagA-producing strains can also promote the release of numerous cytokines, resulting in long-lasting inflammatory responses. It's also possible that molecular mimicry across H. pylori antigens and components of the host causes a variety of extra gastric symptoms through an autoimmune mechanism [14] .

In vitro investigations show that anti-cagA antibodies cross-react with placental tissue, resulting in decreased trophoblast invasion, which supports the pathophysiological connection between H. pylori infection and preeclampsia. Such a mechanism may result in inadequate placentation, which can accelerate the progression of preeclampsia [11] .

CONCLUSION

According to our results, pregnant women who have H. pylori infection are at a higher risk of having preeclampsia. If HP eradication proves to be effective in minimizing the occurrence of PE, screening for HP infection might be expanded to the general population of childbearing age women.

Conflict of interest : none

REFERENCES

1- Phipps E, Prasanna D, and Brima W. Preeclampsia: Updates in Pathogenesis: Definitions, and Guidelines. *Clin J Am Soc Nephrol*. 2016; 11: 1102–13.

2- Duley L. The global impact of pre-eclampsia and eclampsia. *Semin Perinatol*. 2009; 33: 130–7.

3- Nourollahpour Shiadeh M, Behboodi Moghadam Z, and Adam I. Human infectious diseases and risk of preeclampsia: an updated review of the literature. *Infection*. 2017; 45: 589-600.

4- Porras C, Nodora J and Sexton R. Epidemiology of Helicobacter pylori infection in six Latin American Countries. *Cancer Causes Control*. 2013; 24(2): 209-15.

5- Hudak L, Jaraisy A, Haj S, Muhsen K. An updated systematic review and meta-analysis on the association between H elicobacter pylori infection and iron deficiency anemia. *Helicobacter*. 2017; 22(1):e12330.

6- Di Simone N, Tersigni C, and Cardaropoli S. Helicobacter pylori infection contributes to placental impairment in preeclampsia: Basic and clinical evidences. *Helicobacter*. 2017; 22: e12347.

7- Shiadeh NM, Riahi SM, Adam I, Saber V, Behboodi Moghadam Z, Armon B, Spotin A, Nazari Kangavari H, Rostami A. Helicobacter pylori infection and risk of preeclampsia: a systematic review and meta-analysis. *The Journal of Maternal-Fetal & Neonatal Medicine*. 2019; 32(2):324-31.

8- Bellos I, Daskalakis G, And Pergialiotis V. Helicobacter pylori infection increases the risk of developing preeclampsia: A meta-analysis of observational studies. *Int J Clin Pract*. 2018; 72: e13064.

9- American College of Obstetricians and Gynecologists. Hypertension in pregnancy. Report of the American College of Obstetricians and Gynecologists Task Force on Hypertension in pregnancy. *Obstetric Gynecol*. 2013; 122: 1122–1131.

10- World Health Organization. WHO recommendations for prevention and treatment of pre-eclampsia and eclampsia. www.whqlibdoc.*who.int*. 2012.

11- Franceschi F, di Simone N, and D'Ippolito S. Antibodies anti-CagA cross-react with trophoblast cells: a risk factor for pre-eclampsia? *Helicobacter*. 2012; 17:426-34.

12- Shabana AA, Sanad ZF, Alkelany OA, El Khouly NI and Hussain MM. Relationship between Helicobacter pylori infection and pre-eclampsia complicated by intrauterine growth restriction. *Menoufia Medical Journal*. 2016; 29: 705-9.

13- Hagag AA, Amin SM, El-Fiky RB, El-Sayad ME. Study of serum levels of some oxidative stress markers in children with Helicobacter pylori infection. Infectious Disorders-Drug Targets (Formerly Current Drug Targets-Infectious Disorders). 2018; 18(1):52-9.

14- Chmiela M, Gonciarz W. Molecular mimicry in Helicobacter pylori infections. *World J Gastroenterol*. 2017; 23: 3964-77.