Helicobacter Pylori Infection in Pregnant Women with Hyperemesis Gravidarum and Its Effect on Pregnancy Outcome

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Abstract

Background: Numerous studies established a significant positive correlation between HG and the presence of H. pylori.

Aim: This study aimed to assess the effects of helicobacter pylori infection among pregnant women with hyperemesis gravidarum on pregnancy outcome.

Patients and Methods: This cross-sectional study was conducted on 180 pregnant females with hyperemesis gravidarum. Women were assigned to one of two groups: Group A: pregnant women with hyperemesis gravidarum, who were tested positive for the presence of H. pylori infection and group B: pregnant women with hyperemesis gravidarum, who were tested negative for the presence of H. pylori infection.

Results: Group A had significantly higher percentage of abortion, past history of HG and family history of HG than group B with statistically significant differences as $p<0.05$. Group A had significantly lower mean of hemoglobin than group B with statistically significant differences as $p<0.001$. While group A had higher mean of random blood sugar than group B with statistically significant differences as $p=0.014$. Women in group B showed significantly higher resolution of HG than group A ($p<0.001$). Women in group B showed significantly higher resolution of HG and weight gain than group A ($p<0.001$). Group A had higher incidence of preterm labor and neonates with low birth weight than group B with statistically significant differences.

Conclusion: Although a link between H. pylori and HG has previously been established, this paper makes an important contribution to the literature by confirming this relationship among Egyptian women.

Keywords: H. pylori, Pregnancy, Hyperemesis.

Introduction

In a comprehensive study, Golberg et al. discovered that pregnant women with H. pylori infection had a greater

frequency of HG than women who were not infected. However, several research found no connection between HG and H. pylori [1].

Helicobacter pylori affects the health of both the mother and the fetus, and there is no recommended method for getting rid of it in pregnant women. When an H. pylori infection is discovered during pregnancy, it is typically advised to postpone eradication until after birth [2].

The most severe form of pregnancy-related nausea and vomiting, known as hyperemesis gravidarum, can result in weight loss, nutritional deficiencies, and metabolic disturbances like dehydration, acidosis from starvation, hypokalemia, and temporary hepatic dysfunction. As a result, it frequently necessitates hospitalization and medical care to prevent potentially fatal complications. It is second only to premature labor as the most frequent reason for hospitalization during the first half of pregnancy [3].

Since there is no recognized cause of hyperemesis gravidarum, a number of processes, including immunologic and endocrine variables such human chorionic gonadotropin, estrogen, and progesterone, may contribute to this condition. The link between Helicobacter pylori (H. pylori) infection and the risk of hyperemesis gravidarum has been highlighted in several research [4].

In Egypt, 75% of instances of HG were found to have Helicobacter pylori in stool samples, as opposed to 37.50% of healthy pregnant women, according to Elmahdy et al. The stomach is colonized by this bacteria. It usually develops throughout childhood and results in an asymptomatic chronic infection. Peptic ulcers and stomach cancer can occur in a tiny percentage of H. pylori-infected people, often in late adulthood [5].

The association between H. pylori and thrombocytopenia has been shown in a non-pregnant population, and the etiology of thrombocytopenia may be due to cross-molecular mimicry between specific H. pylori protein (CagA) and platelet antigens. Thrombocytopenia is also one of the maternal complications of H. Pylori [6].

Fetal problems including abortion might result from H. pylori infection. According to several research, H. Pylori infection is linked to a greater probability of miscarriage (seropositivity in the abortion group reached 66.7%, compared to 8% in the control group) [3].

Fetal growth retardation is another H. Pylori late fetal problem. The characteristic symptoms of H. Pylori infection in pregnant women include nausea, vomiting, anemia, fetal abnormalities, as well as fetal growth restriction and low birth weight. Pregnant women are one of the most sensitive populations to infection with H. Pylori. According to Graham et al. [7], intrauterine growth restriction affected 13.5% more H. pylori seropositive women than H. pylori-seronegative women.

According to several studies, persons with H. pylori infection had lower plasma levels of vitamin B12 and folate than subjects who are not infected, which is concerning since H. pylori may contribute to neural tube defects.

In this study, helicobacter pylori infection was found in pregnant women with hyperemesis gravidarum, and its impact on maternal and fetal outcomes was assessed.

Aim

The study aimed to improve general health and quality of life of pregnant women.

Patients and methods:

This is a prospective observational study was carried out in Obstetrics and Gynecology department of Suez Canal University hospital from June 2021 to April 2022. Patients attending Obstetrics and Gynecology clinic of Suez Canal University hospital complaining of hyperemesis gravidarum diagnosed by urine analysis, dehydration, vomiting cause > 5% loss of body weight were fulfilling the following criteria:

Inclusion criteria:

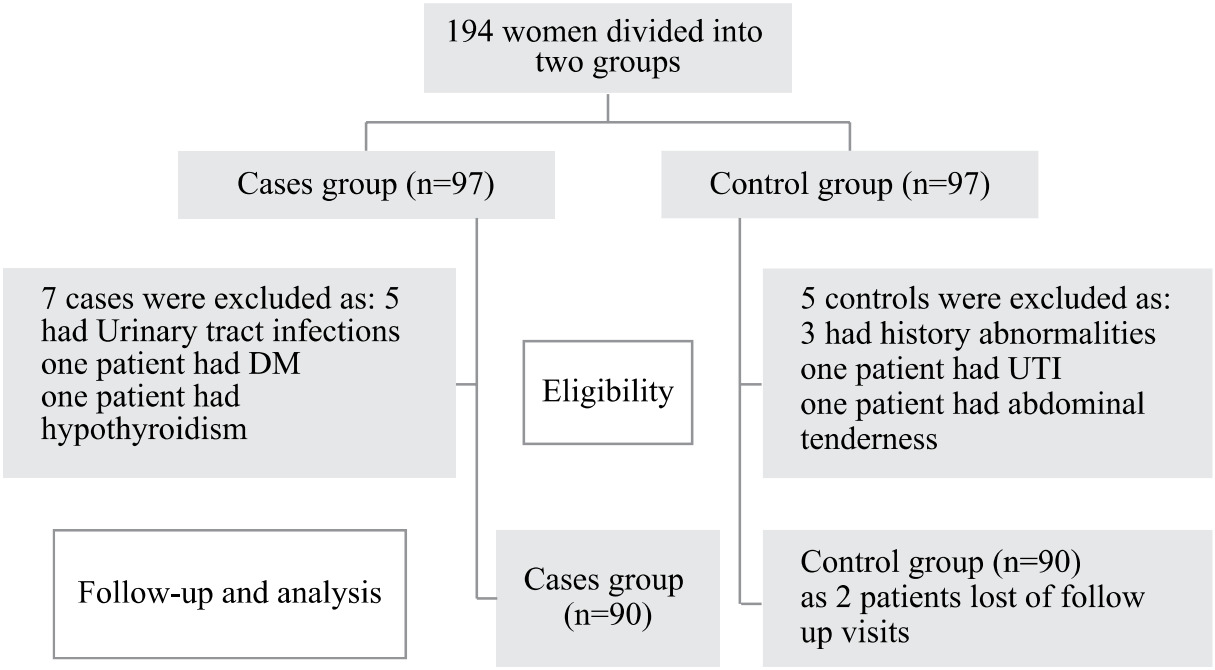
1. Gestational age ranging from 6 to 14 weeks.
2. They should previously have visited the antenatal care clinic of Suez Canal University hospital.
3. Singleton ongoing pregnancy.
4. The Patient was diagnosed and admitted as hyperemesis gravidarum, either clinically (severe vomiting (≥4 times a day) not responding to traditional treatments, weight loss (≥5% of body weight) or laboratory (ketones in urine, electrolyte disturbance).

- Exclusion criteria

1. History of peptic ulcer before pregnancy.
2. History of chronic drug administration "e.g., nonsteroidal anti-inflammatory drugs (NSAIDs).
3. Thyroid disorders
4. Psychiatric problems
5. Liver or renal disorders
6. Urinary tract infections
7. Diabetes Mellitus
8. Multiple gestations
9. Molar pregnancy
10. Smoking

Sampling Technique: Convenient sampling of pregnant women with hyperemesis gravidarum seeking medical care in the study setting was taken.

Figure 1: Flow chart of the study groups.



Methods

Study procedure

1. A thorough medical history and examination were conducted, covering any illnesses affecting the mother or ailments associated with nausea and vomiting, along with a clinical evaluation for indicators of dehydration and the phone number of each patient.
2. The last menstrual cycle was used to calculate the gestational age.
3. The presence of a live fetus, the gestational age, and the exclusion of any obstetric reasons of hyperemesis, such as multiple pregnancies and gestational trophoblastic illness, were all confirmed by ultrasound.

4. The following criteria were used to diagnose hyperemesis:
   - severe vomiting (more than four times per day) with no discernible reason other than pregnancy
   - A positive ketonuria test result.
5. For every case, comprehensive laboratory testing was performed to determine the extent of HG and rule out other medical conditions. This included serum electrolytes, TSH-free T3, and free T4 levels (CBC, FBS, kidney, and liver function tests). Iron supplements were used as a treatment for anemia in women.
6. Urine was analyzed in order to rule out urinary tract infections and to look for ketone bodies.
7. A stool antigen test for H. pylori was conducted. The results of the H. pylori test will determine which of the following two categories the women are placed in:
   - Group A: pregnant patients with hyperemesis gravidarum who had an H. pylori infection and had positive tests.
   - Group B: women experiencing hyperemesis gravidarum during pregnancy who did not have an H. pylori infection.Standard treatment for hyperemesis gravidarum:
     - Diet instructions such as eating small meals all over the day, avoiding spicy, greasy or fried food or food with strong odors, avoiding tea and coffee [8].
     - IV fluids and Electrolyte replacement as:

       I. Ringer lactate IV 8 hourly (500 ml three times daily).

       II. isotonic saline IV 8 hourly (500 ml three times daily) [9].
     - Antiemetics, according to Royal College of Obstetricians and Gynecologists (RCOG) green-top guideline No. 69 (The management of Nausea and Vomiting of Pregnancy and Hyperemesis Gravidarum), such as:

       I. Cyclizine (first line): 50 mg PO, IM or IV 8 hourly.
     - Metoclopramide and Ondansetron (Primperan and Danset) Metoclopramide: 5–10 mg 8 hourly PO, IV or IM (maximum 5 days' duration) and/or Ondansetron: 4- 8 mg 6–8 hourly PO; 8 mg over 15 minutes 12 hourly IV.
     - Vitamin supplementation specially (Vitamin B6 and B12) available as multivitamin combination such as (Becozyme) [8].
8. The clinical response was determined by the improvement of nausea and vomiting, and the increase in body weight in both groups two weeks after the start of management.
9. At every follow up visit weight, blood pressure, Pulse, Hb, HCT, and Platelets were measured. Women who didn`t attend follow up visits were excluded from the study.
10. Evaluation in both groups was done two weeks after intervention, 18th week, 23-24th week via:

    a. Recovery of hyperemesis gravidarum (hospitalization duration and improvement of symptoms).

    b. Persistence of GIT symptoms along pregnancy as: heartburn, nausea, vomiting, dyspepsia, loss of appetite, constipation and diarrhea

    c. Maternal Complications as: maternal iron deficiency anemia and pre-eclampsia and thrombocytopenia

    d. Fetal Complications as: miscarriage, fetal growth restriction and neural tube defects.
11. Patients of both groups (A and B) were followed up clinically at the Obstetrics and Gynecology department.

12. After that, both (group A) and (group B) were followed up after discharge till the end of the pregnancy (either delivery or abortion) to assess the maternal and fetal complications occurred in both groups at least five times as one prenatal visit per month to evaluate:
    - The symptoms of GIT
    - Fetal kicks.
    - Fetal Growth profile by ultrasound.
    - Maternal weight
    - Measure blood pressure to assess preeclampsia
    - CBC to assess the iron deficiency anemia
    - Last visit after delivery to follow up the newborn to assess any fetal complications.
13. The dropout rate was calculated from patients who come for follow up less than 3 prenatal visits.

Data Management & Statistical Analysis

- The data was entered into a Microsoft Excel sheet and then analyzed using the Statistical Package for Social Sciences (SPSS) software program version 25.0 (2017) or higher.
- Data was presented as tables and graphs, as suitable.
- For descriptive analysis, continuous data was expressed as mean ± standard deviation, whereas categorical data was expressed as frequencies and percentages.
- Chi-square test or Fisher exact test were used to compare the baseline characteristics between the two groups, whereas Student t- test was used to compare numerical variables, including the durations, different scores, and weight.
- Results were considered statistically significant at a p-value less than 0.05 and highly significant at p-value less than 0.001.

Results

This cross-sectional study was conducted on 180 pregnant females with hyperemesis gravidarum. According to the H. pylori testing results, women were assigned to one of two groups:

- Group A: pregnant women with hyperemesis gravidarum, who were tested positive for the presence of H. pylori infection.
- Group B: pregnant women with hyperemesis gravidarum, who were tested negative for the presence of H. pylori infection.

Table 1 shows the distribution of maternal characteristics of the study groups. There were statistical insignificant differences between study groups as regard age, parity and BMI as $p>0.05$. Group A had significantly higher percentage of abortion, past history of HG and family history of HG than group B with statistically significant differences as $p<0.05$.

Table 2 shows the distribution of maternal baseline measurements in the study groups. Group A had significantly higher mean of systolic and diastolic blood pressure than group B with statistically significant differences as $p<0.001$.

Table 3 shows the laboratory results in the study groups. Group A had significantly lower mean hemoglobin level than group B with statistically significant differences as $p=0.009$. While group A had higher mean random blood sugar level than group B with statistically significant differences as $p=0.014$.

Table 4 shows the serum electrolyte results in the study groups. Group A had significantly lower mean of potassium than group B with statistically significant differences as $p=0.037$.

Table 5 shows the outcomes after two weeks of intervention among the study groups. Women in group B showed significantly higher resolution of HG than group A ($p<0.001$). Group A had lower weight gain than group B but with statistical insignificant difference.

Table 6 shows the collected data by the end of the first trimester follow-up visit of intervention among the study groups. Women in group B showed significantly higher resolution of HG and weight gain than group A ($p<0.001$). Group A had higher mean of systolic and diastolic blood pressure than group B with statistically significant difference. Group A had lower mean of hemoglobin than group B with statistically significant difference.

Table 7 shows the collected data by the end of the second trimester follow-up visit of intervention among the study groups. Women in group B showed significantly higher resolution of persistent vomiting of pregnancy and weight gain than group A ($p<0.001$). Group A had higher mean of systolic and diastolic blood pressure than group B with statistically significant difference. Group A had lower mean of hemoglobin than group B with statistically significant difference.

Table 8 shows the collected data on the third follow-up visit of intervention among the study groups. Women in group B showed significantly higher resolution of persistent vomiting in pregnancy and weight gain than group A ($p<0.001$). Group A had higher mean of systolic and diastolic blood pressure than group B with statistically significant difference. Group A had lower mean of hemoglobin than group B with statistically significant difference.

Table 9 shows the maternal and neonatal outcomes among the study groups. Women in group A showed significantly higher women with anemia than group A ($p=0.003$). Group A had higher incidence of preterm labor and neonates with low birth weight than group B with statistically significant differences.

Discussion

This cross-sectional study evaluated the effects of helicobacter pylori infection among pregnant women with hyperemesis gravidarum on pregnancy outcome in terms of hyperemesis gravidarum severity, abortion rate, intrauterine growth retardation rate, iron deficiency anemia, thrombocytopenia, and preeclampsia. Its goal was to improve the general health and quality of life of pregnant women. 180 pregnant women with hyperemesis gravidarum participated in this study. The H. pylori testing outcomes placed the ladies in one of two groups: Pregnant women with hyperemesis gravidarum who tested positive for H. pylori infection were placed in group A, whereas those with hyperemesis gravidarum who tested negative for the infection were placed in group B.

According to the research's findings, there was no difference between the analyzed groups in terms of maternal age, body mass index, parity, or fetal gestational age at the beginning of the study. This concurs with a recent research from Egypt [10].

In the current study, women who tested positive for H. pylori had a statistically significant greater frequency of anemia than those who tested negative (p 0.001). With statistically significant differences, preterm labor and low birth weight babies are more common in H. pylori positive women than in H. pylori negative women.

According to another study, pregnant women with H. pylori infection were shown to have low Hb levels from the beginning of pregnancy [11].

Similar to this, Muhsen [12] recommended H. pylori testing and hypothesized that it could be a contributing cause to anemia in pregnant women. This advice is based on several research showing a link between H. pylori and anemia. Muhsen and Cohen conducted

a meta-analysis of epidemiological studies, interventional trials, case reports, and series.

Hb content was found to be considerably lower in cases compared to controls in a recent investigation. Hb was considerably lower in pregnant women with H. pylori infection than in instances without the infection [4]. Anemia was a side effect of H. pylori infection that was noted, and there is positive evidence linking the two conditions in expecting women.

In early pregnancy, women with H. pylori had lower Hb levels than those without it, according to Weyermann et al. (-0.25 g/dl; 95% CI: -0.49 to -0.003). This decrease in Hb level was worse as the pregnancy went on (-0.14 g/dl; 95% CI: -0.38 to 0.10) [13].

According to the findings of the current investigation, there were no appreciable variations in the blood levels of AST and ALT between women who tested positive for h. H. pylori and women who tested negative.

One of the organs that may be impacted by H. pylori infection is the liver, albeit the precise consequences of the bacterial infection and the underlying processes are yet unknown. Given the high prevalence of H. pylori infection in the general population and certain data linking the illness with a certain level of liver damage [14].

The question of whether H. pylori has any impact on the level of liver enzymes in the pregnant women tested was investigated in Hussein's study [4]. The findings showed that HG-affected women had considerably higher mean levels of liver enzymes than control women. Findings showed that the activity of AST was substantially higher in instances testing positively than in cases testing negatively. Previous research introduced two hypotheses: that there is an extrahepatic source for increased AST level and/or that there is a host genetic predisposition to both H. pylori infection and increased levels of liver enzymes [15]. This is because there is no association between H. pylori and ALT level, which is more specific than AST.

In the current investigation, group A had a statistically significant difference (p=0.037) lower mean potassium level than group B.

In accordance, Hussein's study [4] discovered that women with HG had considerably lower mean potassium levels than the controls.

According to McCarthy et al., hyperemesis gravidarum (HG), a condition marked by persistent, severe nausea and vomiting, 0.3–2% of pregnant women experience the ensuing ketosis [16].

According to the Azami et al. study, pregnant women with H. pylori infection had lower potassium levels than pregnant women with hyperemesis [11].

In the current investigation, there were 2 (2.2%) women with preeclampsia who also had H. pylori.

In line with a recent comprehensive study, which found that some negative consequences during pregnancy may have an independent link with H pylori infection. Contrary to H pylori infection negative, H pylori infection positive during pregnancy was substantially associated with a greater risk of preeclampsia, foetal growth restriction, gestational diabetes mellitus, and hyperemesis gravidarum [17].

In this study, women in group A experienced greater rates of preterm labor and low birth weight babies than women in group B, with statistically significant differences.

A substantial positive association between HG and the presence of H. pylori and poor newborn outcomes has been confirmed by several research [6].

Alwahed et al. [18] discovered in their research of pregnant women with HG that these women had a considerably greater prevalence of H. pylori than those who do not have HG (69 vs. 15%; P 0.001).

Li et al. looked at publications that were published in multiple databases before

March 20, 2014 for another meta-analysis of the H. pylori-HG connection. According to their data, expecting women with HG have a considerably greater incidence of H. pylori infection (P 0.001). According to this systematic review, H. pylori is one of the risk factors for HG and is associated with an increased risk of miscarriage, low birth weight, and premature labor [19].

Utilizing the stool antigen test is this study's main area of strength. Of course, this study's primary weakness is its tiny sample size. The power of this result is poor, which suggests that although the current study identified a significant link between HG and H. pylori, there may still be sociodemographic differences between women with HG and those without that did not reach the level of significance. Additionally, additional possible variables like socioeconomic status and gestational age were left unadjusted.

Conclusion

Investigations into HG should include H. pylori testing, particularly when the disease does not improve with therapy and in instances that last through the first trimester. It is necessary to conduct further study on H. pylori infection in the community of pregnant women who suffer from severe vomiting and nausea. To validate the findings of the current study, more prospective studies with bigger sample sizes are required.

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Tables and Figures

Table 1: Maternal characteristics of the study population

Variables	Group A (n=90)	Group B (n=90)	Test value	P-value
Maternal age (years) mean±SD	29.6 ± 6.0	30.3 ± 6.01	0.817	0.440[1]
Parity (n,%) Nulliparous Multipara	 42(46.7%) 48(53.3%)	 37(41.1%) 53(58.9%)	 0.643	0.523[2]
Abortion No Yes	 24(26.7%) 66(73.3%)	 60(66.7%) 30(33.3%)	4.62	**<0.001**[*2]
BMI (kg/m^2) mean±SD	29.1 ± 5.0	27.8 ± 4.5	1.098	0.069[1]
Past history of HG (n,%)	13(14.4%)	3(3.3%)	3.99	**0.001**[*3]
Family history of HG (n,%)	9(9.9%)	1(1.1%)	3.61	**0.018**[*3]

Table 2: Maternal baseline measurements among the study group.

Variables	Group A (n=90)	Group B (n=90)	Test value	P-value
Gestational age (weeks) mean±SD	8.6 ± 2.5	8.4 ± 2.6	0.752	0.762[1]
Systolic Bl.P (mmHg) mean±SD	105.1± 4.3	95.03 ± 6.1	5.23	**<0.001**[*1]
Diastolic Bl.P (mmHg) mean±SD	75.0 ± 3.2	60.2 ± 9.7	4.72	**<0.001**[*1]
Respiratory rate (breath/minute) mean±SD	26.1 ± 5.0	24.8 ± 4.5	1.66	0.069[1]
Pulse (beat/minute) mean±SD	80.4 ± 6.4	80.4 ± 6.6	0.091	0.982[1]

Table 3: Laboratory investigations results among the study groups.

Variables	Group A (n=90)	Group B (n=90)	Test value	P-value
Hb (g/dl) mean±SD	9.6 ± 1.89	10.5 ± 2.11	3.62	**0.009**[*1]
HCT (%) mean±SD	26.7± 3.5	33.9 ± 3.1	2.88	**0.017**[*1]
3 Platelets (*10) mean±SD	189 ± 32	198 ± 33	1.54	0.065[1]
PT (seconds) mean±SD	12.3 ± 1.1	12.4 ± 1.2	0.541	0.683[1]
INR (seconds) mean±SD	1.3 ± 0.2	1.2 ± 0.2	0.650	0.597[1]
ALT (U/L) mean±SD	33.7 ± 3.0	33.9 ± 3.5	0.508	0.653[1]
AST (U/L) mean±SD	34.4 ± 3.1	34.9 ± 3.3	0.871	0.312[1]
Creatinine (mg/dl) mean±SD	0.62 ± 0.05	0.69 ± 0.04	1.34	0.082[1]
RBS (mg/dl) mean±SD	101.0 ± 16.6	79.6 ± 16.0	3.01	**0.014**[*1]

Table 4: Serum electrolyte and ABG results among the study groups.

Variables	Group A (n=90)	Group B (n=90)	Test value	P-value
Sodium (mEq/L) mean±SD	134.1 ± 3.1	134.2 ± 3.6	0.091	0.841[1]
Potassium (mEq/L) mean±SD	3.7 ± 0.9	4.6 ± 0.8	2.96	**0.037**[*1]
PH mean±SD	7.42 ± 0.04	7.43 ± 0.03	0.112	0.800[1]

CO2 (mmHg) mean±SD	54.4 ± 2.2	54.6 ± 2.4	0.503	0.650[1]
HCO3 (mEq/L) mean±SD	26.6 ± 1.1	26.7 ± 1.2	0.342	0.400[1]

Table 5: Comparison of outcomes after two weeks of intervention among the study groups.

Variables	Group A (n=90)	Group B (n=90)	Test value	P-value
Body weight gain (n,%) No Yes	88(97.8%) 2(2.2%)	83(92.2%) 7(7.8%)	0.891	0.169[1]
Resolution of HG (n,%) No Yes	88(97.8%) 2(2.2%)	88(97.8%) 2(2.2%)	5.25	**<0.001**[*1]
Duration of hospitalization (days) mean±SD	6.0± 2.2	7.1 ± 2.3	0.603	0.594[2]

Table 6: Comparison of collected data by the end of first trimester follow-up visit among the study groups.

Variables	Group A (n=90)	Group B (n=90)	Test value	P-value
Gestational age (weeks) mean±SD	15.2± 0.3	15.5 ± 0.5	0.008	0.991[1]
Persistent GIT symptoms (n,%) No Yes	2(2.2%) 88(97.8%)	19(21.1%) 71(78.9%)	4.67	**<0.001**[*1]
Weight gain (n,%) **Normal** **Abnormal**	82(91.1%) 8(8.9%)	59(65.6%) 31(34.4%)	5.61	<0.001[*1]
Systolic Bl.P (mmHg) mean±SD	119.7± 9.1	99.8 ± 8.5	4.78	**<0.001**[*2]
Diastolic Bl.P (mmHg) mean±SD	70.5± 4.3	65.3 ± 5.5	3.89	**<0.001**[*2]
Pulse (beat/minute) mean±SD	79.0± 5.5	80.09 ± 6.1	0.992	0.229[2]
Hb (g/dl) mean±SD	9.9 ± 1.0	10.8 ± 0.8	1.99	**0.042**[*1]
HCT (%) mean±SD	27.5± 2.9	32.6 ± 2.5	2.42	**0.023**[*2]
3 Platelets (*10) mean±SD	188.5 ± 32.3	201.2± 31.2	1.05	0.065[1]
IUGR (n,%)	0(0%)	0(0%)	--	1.00[1]
IUGR (n,%)	0(0%)	0(0%)	--	1.00[1]

Table 7: Comparison of collected data by the end of the second trimester follow-up visit among the study groups.

Variables	Group A (n=90)	Group B (n=90)	Test value	P-value
Gestational age (weeks) mean±SD	26.2± 0.3	26 ± 0.5	0.021	0.981[1]
Persistent GIT symptoms (n,%) No Yes	 30(33.3%) 60(66.7%)	 54(60.0%) 36(40.0%)	5.76	**0.001**[*1]
Weight gain (n,%) No Yes	82(91.1%) 8(8.9%)	56(62.2%) 34(37.8%)	4.5	**<0.001**[*1]
Proteinuria (n,%) +	2(2.2%)	0(0.0%)	0.728	0.104[1]
Number of fetal Kicks mean±SD	5.4± 1.9	8.5 ± 1.5	6.17	**<0.001**[*2]
Systolic Bl.P (mmHg) mean±SD	123.7± 10.2	103.4 ± 9.2	7.87	**<0.001**[*2]
Diastolic Bl.P (mmHg) mean±SD	71.3± 3.9	67.4 ± 6.1	3.66	**<0.001**[*2]
Pulse (beat/minute) mean±SD	80.2± 4.3	78.4 ± 5.5	0.524	0.371[2]
Hb (g/dl) mean±SD	9.1± 1.4	10.5± 1.5	2.15	**0.039**[*1]
HCT (%) mean±SD	39.5± 3.2	39.8 ± 4.5	0.092	0.825[2]
3 Platelets (*10) mean±SD	191.5 ± 29.5	200.5± 30.3	1.02	0.065[1]
Asymmetrical IUGR (n,%)	2(2.2%)	0(0%)	--	0.526[1]
IUFD (n,%)	0(0%)	0(0%)	--	1.00[1]

Table 8: Comparison of collected data by the end of 36th week visit among the study groups.

Variables	Group A (n=90)	Group B (n=90)	Test value	P-value
Gestational age (weeks) mean±SD	36± 0.3	36.1 ± 0.3	0.014	0.992
Persistent GIT symptoms (n,%) No Yes	 45(50%) 45(50%)	 62(68.9%) 28(31.1%)	4.88	**<0.001**[*1]
Weight gain (n,%) No yes	 73(91.1%) 17(8.9%)	 39(43.3%) 51(56.7%)	5.11	**<0.001**[*1]

Proteinuria (n,%) + ++	86(95.5%) 4(4.5%)	90(100.0%) 0(0.0%)	0.651	0.104[1]
Number of fetal Kicks mean±SD	9.2± 0.6	11.5 ± 1.2	0.998	0.082[2]
Systolic Bl.P (mmHg) mean±SD	119.3± 9.5	105.3±8.2	5.46	**0.008**[*2]
Diastolic Bl.P (mmHg) mean±SD	79.7± 5.4	70.3 ± 5.2	3.18	**<0.001**[*2]
Pulse (beat/minute) mean±SD	79.4± 5.1	76.4 ± 3.4	0.413	0.534[2]
Hb (g/dl) mean±SD	9.8± 0.8	10.8± 1.2	2.00	**0.047**[*1]
HCT (%) mean±SD	39.1± 4.2	40.1 ± 3.6	0.102	0.877[2]
3 Platelets (*10) mean±SD	190.8 ± 30.1	201.2± 29.8	1.12	0.224[1]
IUGR (n,%)	3(3.3%)	1(1.1%)	0.423	0.526[1]
IUFD (n,%)	0(0%)	0(0%)	--	1.00[1]

Table 9: Comparison of maternal and neonatal outcomes among the study groups at delivery.

Variables	Group A (n=90)	Group B (n=90)	Test value	P-value
Anaemia (n,%)	30(33.3%)	14(15.6%)	4.27	**0.003**[*1]
Preeclampsia (n,%)	2(2.2%)	0(0.0%)	0.712	0.208[1]
Preterm labour (n,%)	8(8.9%)	2(2.2%)	3.01	**0.034**[*1]
Low birth weight (n,%)	22(24.4%)	4(4.5%)	4.22	**0.016**[*1]