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Gastrointestinal Symptoms in Pregnancy: The Influence of Thyroid-Stimulating Hormone and Modifiable Risk Factors

Gebelikte Gastrointestinal Semptomlar: Tiroid Uyarıcı Hormonun Etkisi ve Değiştirilebilir Risk Faktörleri

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ABSTRACT

Aim: This study aimed to evaluate the prevalence of gastrointestinal (GI) symptoms during pregnancy and identify hormonal, nutritional, and lifestyle factors contributing to their severity.
Material and Methods: The study was conducted involving 612 pregnant women aged 20 to 40 years, with gestational ages between 5 and 36 weeks. Participants were categorized into three groups based on their trimester. GI symptoms were assessed using the gastrointestinal symptom rating scale (GSRS). A structured questionnaire was used to collect data on demographic characteristics, obstetric history, prior GI conditions, and lifestyle factors.
Results: The study found that indigestion (77.6%, n=475), reflux (68.5%, n=419), and abdominal pain (69.9%, n=428) were the most common GI symptoms reported. While indigestion (78.4%, n=171) followed by nausea (76.1%, n=166) was the most common symptoms in the first trimester, abdominal pain (78.1%, n=171) and reflux (76.3%, n=167) were most frequent in the second trimester, In the third trimester, indigestion (81.1%, n=142) was again the most common symptom, followed by reflux (76.6%, n=134). High GSRS scores were found to be significantly associated with excessive tea consumption (OR: 4.22, 95% CI: 1.44-12.35, p<0.001), employment status (OR: 2.32, 95% CI: 1.63-3.32, p<0.001), and TSH levels (OR: 1.26, 95% CI: 1.13-1.41, p<0.001).
Conclusion: GI symptoms are highly prevalent during pregnancy and are influenced by modifiable factors such as tea consumption, weight gain, and work-related stress. Monitoring thyroid function, managing weight, reducing tea intake, and addressing stress may help alleviate these symptoms, thereby improving the quality of life for pregnant women.
Keywords: Gastrointestinal diseases; pregnancy; risk factors.

ÖZ

Amaç: Bu çalışmanın amacı gebelik sırasında gastrointestinal (GI) semptomların yaygınlığını değerlendirmek ve bu semptomların şiddetine katkıda bulunan hormonal, beslenme ve yaşam tarzı faktörlerini belirlemektir.
Gereç ve Yöntemler: Bu çalışma, 20 ila 40 yaşları arasında, gestasyonel yaşları 5 ila 36 hafta arasında olan 612 gebe kadın ile yapılmıştır. Katılımcılar, trimesterlerine göre üç gruba ayrılmıştır. GI semptomlar, gastrointestinal semptom derecelendirme ölçeği (gastrointestinal symptom rating scale, GSRS) kullanılarak değerlendirilmiştir. Demografik özellikler, obstetrik geçmiş, önceki GI durumlar ve yaşam tarzı faktörleri hakkında veri toplamak amacıyla yapılandırılmış bir anket uygulanmıştır.
Bulgular: Çalışmada en sık görülen GI semptomların sindirim bozukluğu (%77,6, n=475), reflü (%68,5, n=419) ve karın ağrısı (%69,9, n=428) olduğu bulundu. İlk trimesterde sindirim bozukluğu (%78,4, n=171) ve bunu izleyen bulantı (%76,1, n=166) en sık görülen semptomlar iken, ikinci trimesterde karın ağrısı (%78,1, n=171) ve reflü (%76,3, n=167) en sık idi. Üçüncü trimesterde ise sindirim bozukluğu (%81,1, n=142) yine en sık görülen semptomdu ve bunu reflü (%76,6, n=134) izlemekteydi. Yüksek GSRS skorlarının aşırı çay tüketimi (OR: 4.22, %95 CI: 1.44-12.35, p<0.001), çalışma durumu (OR: 2.32, %95 CI: 1.63-3.32, p<0.001) ve TSH düzeyleri (OR: 1.26, %95 CI: 1.13-1.41, p<0.001) ile anlamlı şekilde ilişkili olduğu bulundu.
Sonuç: GI semptomlar gebelik sırasında oldukça yaygındır ve çay tüketimi, kilo artışı ve iş kaynaklı stres gibi değiştirilebilir faktörlerden etkilenmektedir. Tiroid fonksiyonlarının izlenmesi, kilo yönetimi, çay tüketiminin azaltılması ve stresle başa çıkma yöntemleri, bu semptomları hafifletmeye yardımcı olabilir ve böylece gebe kadınların yaşam kalitesini iyileştirebilir.
Anahtar kelimeler: Gastrointestinal hastalıklar; gebelik; risk faktörleri.

INTRODUCTION

Pregnancy is characterized by a complex physiological change that can lead to a wide range of symptoms, including common gastrointestinal (GI) complaints such as heartburn, nausea, vomiting, and constipation (1). These GI disturbances are frequently encountered during pregnancy, with varying degrees of severity, and are typically managed by obstetricians (2-4). While many of these symptoms are considered mild to moderate, they can significantly impact a pregnant woman's quality of life (5,6).

Understanding the mechanisms behind these complaints is critical for effective management and improving maternal well-being. Hormonal fluctuations, particularly elevated levels of progesterone and human chorionic gonadotropin (hCG), play a central role in the development of GI symptoms (1,7,8). Progesterone delays gastric emptying by relaxing smooth muscle, which, combined with increased gastric acidity due to higher gastrin production by the placenta, contributes to the onset of gastroesophageal reflux disease (GERD) and other conditions (9,10).

GERD affects 40-85% of pregnant women, starting in the first trimester and often persisting throughout the pregnancy (9,10). Similarly, constipation, another frequent complaint, is thought to result from the relaxing effect of progesterone on intestinal smooth muscle, reduced bowel motility, and increased colonic water absorption (10,11). Iron supplementation, commonly prescribed during pregnancy, can further exacerbate constipation (12). Nausea and vomiting, which affect 50-80% of pregnant women, are among the most common medical conditions during pregnancy, peaking between the 8^{th} and 12^{th} weeks and generally subsiding by the 20^{th} week (13). Although the exact mechanism is not fully understood, these symptoms are believed to result from the combined effects of hormonal changes, delayed gastric emptying, and psychological factors such as anxiety or depression (1,3,14). For most women, these symptoms resolve without the need for pharmacological intervention and can be managed through dietary adjustments and lifestyle modifications.

Despite the prevalence of these GI complaints, the underlying risk factors that predispose pregnant women to these conditions remain incompletely understood (1-4,15). This study aimed to evaluate the prevalence of GI symptoms during pregnancy and identify the lifestyle (tea consumption, employment status, weight gain), as well as hormonal (thyroid-stimulating hormone, TSH) and nutritional (iron supplements) factors contributing to their severity. By gaining a deeper understanding of these risk factors, the study hoped to inform more effective prevention and management strategies, ultimately improving the quality of care for pregnant women.

MATERIAL AND METHODS

This prospective observational study included 612 pregnant women, aged 20 to 40 years, with gestational ages ranging from 5 to 36 weeks, who attended antepartum clinics for routine prenatal care at Ankara Etlik City Hospital. Ethical approval was obtained from the local ethics committee (numbered AEŞH-BADEK-2024-016, dated 10.01.2024). Participants were categorized into three groups based on their trimester, 218 women in the first, 219 in the second, and 175 in the third trimester. All participants provided written informed consent prior to enrollment, in compliance with ethical standards.

GI symptoms were assessed using the gastrointestinal symptom rating scale (GSRS). GSRS is a validated and reliable instrument designed to evaluate GI complaints (16) and validated for use in the Turkish population (17). The GSRS consists of 15 questions, divided into five symptom clusters: Reflux (burning and discomfort related to reflux), Indigestion (gurgling in stomach, bloating), Abdominal Pain (nausea, pain due to hunger, pain in the upper part of the abdomen), Diarrhea, and Constipation. Each item is rated on a seven-point Likert scale, with 1 representing no symptoms and 7 indicating very troublesome symptoms. This scoring method allows for a comprehensive assessment of how GI symptoms affect the quality of life during pregnancy. The instrument helps to capture both the frequency and severity of these symptoms, providing a targeted measure for antepartum care.

In addition to these scales, a structured questionnaire was administered to collect data on participants' demographic characteristics (age, body mass index (BMI), educational status), obstetric history (gravidity, parity, previous pregnancies), previous GI conditions (such as peptic ulcers, irritable bowel syndrome), history of diagnostic procedures (e.g., gastroscopy, colonoscopy), and daily habits such as tea, coffee, and tobacco consumption, exercise routines, and the use of supplements (e.g., iron, multivitamins, and vitamin D).

Women with pre-existing chronic GI diseases requiring ongoing treatment, systemic conditions (e.g., diabetes, autoimmune diseases), multiple pregnancies, and use of medications known to affect GI function were excluded. Blood samples were collected from all participants during their first prenatal visit for routine biochemical analysis, including liver function tests, complete blood count, thyroid function tests, and serum electrolytes. These data, along with the GSRS scores and lifestyle information, were used to analyze the association between GI symptoms and potential metabolic and lifestyle factors.

Statistical Analysis

Data were analyzed using IBM SPSS v.26. Continuous variables were reported as mean±standard deviation, while categorical variables were expressed as frequencies and percentages. The normality of the data was assessed using the Kolmogorov-Smirnov test and the histogram and skewness-kurtosis values. The equality of variances was tested using Levene's test. Comparisons between trimesters were made using one-way ANOVA with post hoc Tukey analysis. The relationship between GSRS scores and potential risk factors was assessed using Pearson correlation coefficients. To identify independent predictors of higher GSRS scores, binary logistic regression analysis was conducted. The model included the following variables: age, BMI, gestational week, excessive tea consumption, employment status, and TSH levels. These variables were selected based on prior research and their theoretical relevance to GI symptoms during pregnancy. Age, BMI, and gestational week were included to control for potential confounders, as they are known to influence both GI symptoms and other risk factors. Model fit was evaluated using the Hosmer-Lemeshow test, which tests

the goodness-of-fit for the logistic regression model. The p-value for this test indicated whether the model fit the data well. The Nagelkerke R^2 statistic was reported to assess the proportion of variance explained by the model. The odds ratio (OR) with a 95% confidence interval (CI) was calculated for each independent variable to assess the strength and direction of the relationship between the predictors and GSRS scores. A p-value of less than 0.05 was considered statistically significant for all analyses.

RESULTS

The general characteristics and blood results of the study group were summarized in Table 1. Of the 612 participants, 29.9% (n=183) reported that they do not consume tea, 43.1% (n=264) of participants reported that they do not consume coffee, 73.0% (n=447) used antianemic drugs, 70.3% (n=430) took vitamin D supplement, 65.0% (n=398) did not engage in regular exercise, 6.2% (n=38) were current smokers, and 66.0% (n=404) were not employed during pregnancy (Table 2).

The GSRS responses of the participants and the comparison by trimester were presented in Table 3. The most frequently reported GI symptoms among the entire study group were indigestion (77.6%, n=475), reflux (68.5%, n=419), and abdominal pain (69.9%, n=428), including nausea. Indigestion (78.4%, n=171) was the most common symptom among women in the first trimester, followed by nausea (76.1%, n=166). In the second trimester, abdominal pain (78.1%, n=171) and reflux (76.3%, n=167) were the most frequently reported symptoms, followed by indigestion (74.0%, n=162). In the third trimester, indigestion (81.1%, n=142) was again the most common symptom, followed by reflux (76.6%, n=134). The mean total GSRS scores of women in each trimester based on tea consumption were shown in Figure 1.

Table 1. General characteristics and blood results of the study population, and comparison of groups by trimester

	1st trimester (n=218)	2nd trimester (n=219)	3rd trimester (n=175)	p	Study Group (n=612)
Age (year)	30.22±6.08	30.13±5.97	29.89±5.81	0.856	30.09±5.96
Weight gain (kg)	10.54±3.34[a]	15.21±4.26[b]	15.48±3.82[b]	**<0.001**	13.62±4.46
Pre-pregnancy weight (kg)	64.72±12.09[a]	59.18±12.39[b]	59.52±12.06[b]	**<0.001**	61.25±12.44
BMI (kg/m^2)	28.08±4.78	27.77±4.75	27.88±4.85	0.798	27.91±4.78
Glucose (mg/dL)	92.19±12.11	91.63±12.99	94.53±12.89	0.630	92.66±12.69
BUN (mg/dL)	27.11±6.74	27.15±6.44	26.49±6.93	0.556	26.95±6.69
Creatinine (mg/dL)	0.70±0.14	0.69±0.13	0.69±0.14	0.674	0.69±0.14
ALT (IU/L)	15.77±9.45	16.76±9.60	15.66±8.91	0.416	16.09±9.35
AST (IU/L)	17.27±9.93	17.02±9.76	17.10±10.00	0.965	17.13±10.00
Hb (mg/dL)	9.70±3.21	9.80±3.08	9.71±3.13	0.940	9.74±3.14
TSH (mU/ml)	1.83±1.27[a]	3.11±1.52[b]	3.02±1.53[b]	**<0.001**	3.07±1.57
T4 (ng/dL)	1.21±0.27[a]	1.15±0.26[b]	1.23±0.26[a]	**0.012**	1.20±0.26

BMI: body mass index, BUN: blood urea nitrogen, ALT: alanine transaminase, AST: aspartate aminotransferase, Hb: hemoglobin, TSH: thyroid-stimulating hormone, [a,b]: groups with different letters are significantly different from each other

Table 2. Daily lifestyle and nutritional factors study group

	n=612
Tea consumption, n (%)	
None	183 (29.9)
1-2 cups	257 (42.0)
3-4 cups	157 (25.7)
≥5 cups	15 (2.4)
Coffee consumption, n (%)	
None	264 (43.1)
1-2 cups	201 (32.8)
3-4 cups	143 (23.4)
≥5 cups	4 (0.7)
Smoking, n (%)	
None	459 (75.0)
Before pregnancy	115 (18.8)
1-2 per day	20 (3.3)
≥3 per day	18 (2.9)
Antianemic intake, n (%)	447 (73.0)
Vitamin D intake, n (%)	430 (70.3)
Exercise, n (%)	214 (35.0)
Working status, n (%)	208 (34.0)
Education, n (%)	
No	49 (8.0)
Primary school	153 (25.0)
High school	191 (31.2)
University	169 (27.6)
MSc/PhD	50 (8.2)

MSc/PhD: master of science/doctor of philosophy

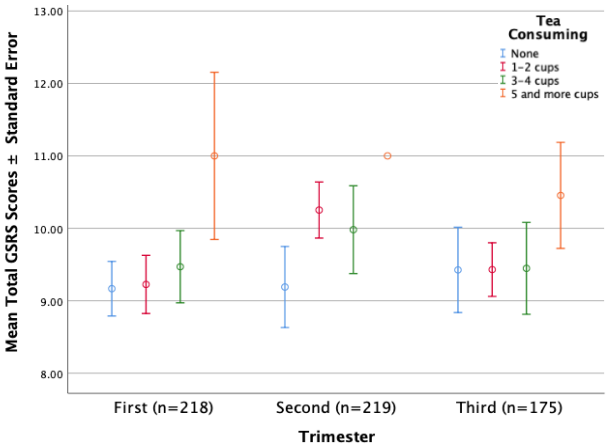

Figure 1. Gastrointestinal symptom rating scale scores in each trimester categorized by tea consumption habits

Table 3. Prevalence of gastrointestinal symptoms in the study group and by trimester, based on the GSRS score

	1st trimester (n=218)	2nd trimester (n=219)	3rd trimester (n=175)	p	Study Group (n=612)
Reflux, n (%)					
No discomfort at all	100 (45.9)[a]	52 (23.7)[b]	41 (23.4)[b]	**<0.001**	193 (31.5)
Minor discomfort	53 (24.3)	66 (30.1)	49 (28.0)		168 (27.5)
Mild discomfort	56 (25.7)	71 (32.4)	59 (33.7)		186 (30.4)
Moderate discomfort	9 (4.1)[a]	30 (13.7)[b]	26 (14.9)[b]		65 (10.6)
Indigestion, n (%)					
No discomfort at all	47 (21.6)	57 (26.0)	33 (18.9)	0.985	137 (22.4)
Minor discomfort	67 (30.7)	58 (26.5)	60 (34.3)		185 (30.2)
Mild discomfort	70 (32.1)	56 (25.6)	47 (26.9)		173 (28.3)
Moderate discomfort	32 (14.7)	43 (19.6)	31 (17.7)		106 (17.3)
Moderately severe discomfort	2 (0.9)	5 (2.3)	4 (2.3)		11 (1.8)
Abdominal Pain, n (%)					
No discomfort at all	52 (23.9)[a]	48 (21.9)[a]	84 (48.0)[b]	**<0.001**	184 (30.1)
Minor discomfort	69 (31.7)	68 (31.1)	49 (28.0)		186 (30.4)
Mild discomfort	55 (25.2)[ab]	61 (27.9)[b]	30 (17.1)[a]		146 (23.9)
Moderate discomfort	42 (19.3)[b]	42 (19.2)[b]	12 (6.9)[a]		96 (15.7)
Diarrhea, n (%)					
No discomfort at all	161 (73.9)	168 (76.7)	116 (66.3)	0.065	445 (72.7)
Minor discomfort	57 (26.1)	51 (23.3)	59 (33.7)		167 (27.3)
Constipation, n (%)					
No discomfort at all	152 (69.7)	143 (65.3)	117 (66.9)	0.607	412 (67.3)
Minor discomfort	59 (27.1)	61 (27.9)	41 (23.4)		161 (26.3)
Mild discomfort	7 (3.2)	15 (6.8)	17 (9.7)		39 (6.4)

GSRS: gastrointestinal symptom rating scale

There was a positive and weak correlation between the total GSRS score and TSH level (r=0.129, p=0.001). Weight gain (r=0.187, p<0.001), gestational week (r=0.167, p<0.001), and TSH level (r=0.082, p=0.043) were also found to be positively and weakly correlated with the reflux score. On the other hand, weight gain (r=-0.132, p<0.001) and gestational week (r=-0.206, p<0.001) were found negatively and weakly correlated with nausea score (Table 4).

Binary logistic regression analyses revealed several factors significantly associated with high GSRS score (Table 5). Consuming ≥5 cups of tea per day was associated with a high GSRS score (OR: 4.22, 95% CI: 1.44-12.35, p<0.001). Employment status was also significantly related to high GSRS score (OR: 2.32, 95% CI: 1.63-3.32, p<0.001), as were TSH level (OR: 1.26, 95% CI: 1.13-1.41, p<0.001). Furthermore, in terms of symptom clusters of the GSRS, weight gain (OR: 1.06, 95% CI: 1.02-1.10, p=0.001), gestational week (OR: 1.02, 95% CI: 1.01-1.04, p=0.002), and tea consumption exceeding 5 cups per day (OR: 7.26, 95% CI: 1.97-26.66, p=0.003) were the most strongly associated factors with higher reflux scores. Gestational age (OR: 0.965, 95% CI: 0.948-0.983, p<0.001) was found to be negatively associated with nausea scores.

Table 4. Correlation analysis between variables and gastrointestinal symptom scores

		Weight Gain	Gestational week	TSH
Total GSRS score	**r**	0.056	0.031	0.129
	p	0.165	0.448	**0.001**
Reflux score	**r**	0.187	0.167	0.082
	p	**<0.001**	**<0.001**	**0.043**
Indigestion score	**r**	0.031	0.039	0.085
	p	0.447	0.336	**0.035**
Nausea score	**r**	-0.132	-0.206	0.020
	p	**0.001**	**<0.001**	0.628

GSRS: gastrointestinal symptom rating scale, TSH: thyroid-stimulating hormone

DISCUSSION

The findings of this study indicate that GI symptoms, particularly indigestion, reflux, and abdominal pain including nausea, are highly prevalent during pregnancy, with notable variations across different trimesters. Additionally, we identified several key factors associated with increased severity of GI symptoms, including TSH levels, tea consumption, employment status, and weight gain.

Compared to Zielinski et al. (18), which focuses on common GI conditions in pregnancy like GERD, diarrhea, and constipation, the present study specifically highlights hormonal and lifestyle factors, such as tea consumption and stress, influencing these symptoms. While both emphasize the variability of symptoms, this study offers more targeted management strategies. Naumann et al. (19) similarly address heartburn and nausea as common pregnancy symptoms but do not identify specific contributing factors. The present study adds depth by linking these symptoms to factors like weight gain, TSH levels, and tea intake, offering practical insights for symptom relief. In line with Zhang et al. (20), both studies recognize lifestyle factors in GI symptoms, though Zhang et al. (20) emphasize sedentary behavior and cold beverage consumption.

The weak but significant correlation between total GSRS scores and TSH levels suggests that thyroid function may play a role in the development of GI symptoms during pregnancy. This finding is consistent with previous studies that have demonstrated an association between altered thyroid hormone levels and GI disturbances such as constipation and reflux (21). Thyroid hormones can influence gut motility and the relaxation of the lower

Table 5. Univariate and multivariate logistic regression analysis results of the variables associated with high gastrointestinal symptom rating scale scores

Factor	Univariate Logistic Regression		Multivariate Logistic Regression	
	OR (95% CI)	p	OR (95% CI)	p
Age (year)	1.02 (0.99-1.05)	0.108	-	-
Weight gain (kg)	0.99 (0.95-1.03)	0.650	-	-
BMI (kg/m^2)	0.99 (0.96-1.03)	0.966	-	-
TSH (mU/ml)	1.26 (1.13-1.41)	**<0.001**	1.20 (1.07-1.35)	**<0.001**
Smoking (Yes)	1.22 (0.79-1.89)	0.352	-	-
Tea consumption (≥5 cups)	4.22 (1.44-12.35)	**<0.001**	2.84 (0.94-8.63)	**0.017**
Coffee consumption (Yes)	1.00 (0.74-1.35)	0.987	-	-
Exercise (Yes)	0.89 (0.61-1.28)	0.533	-	-
Employment status (Yes)	2.32 (1.63-3.32)	**<0.001**	2.15 (1.49-3.10)	**<0.001**

BMI: body mass index, TSH: thyroid-stimulating hormone, OR: odds ratio, CI: confidence interval

esophageal sphincter, contributing to the onset of symptoms such as heartburn and nausea (22). While the correlation was weak, it highlights the importance of monitoring thyroid function as part of prenatal care, especially in women presenting with GI complaints.

This study also found that weight gain and gestational week were positively correlated with reflux scores. As pregnancy progresses, the enlarging uterus exerts increased pressure on the stomach, contributing to gastroesophageal reflux (23). This mechanical factor, coupled with hormonal changes -particularly elevated progesterone levels- explains the high prevalence of reflux symptoms, especially in the third trimester. Weight gain further exacerbates this condition by increasing intra-abdominal pressure, a finding supported by prior research showing a similar association between BMI and reflux in non-pregnant populations (24,25).

The relationship between tea consumption and GI symptoms is a novel finding in this population. Women who consumed more than five cups of tea daily had significantly higher GSRS and reflux scores. Tea, particularly black tea, contains compounds like caffeine and theobromine, which can relax the lower esophageal sphincter and increase gastric acidity, contributing to reflux symptoms (26). While caffeine has been widely studied in relation to pregnancy outcomes, its impact on GI symptoms, specifically reflux, has received less attention (27). The results of the present study suggest that reducing tea consumption could be a simple and effective intervention for managing reflux symptoms during pregnancy.

Interestingly, employment status was another significant factor associated with higher GSRS scores. Women who were employed during pregnancy reported more severe GI symptoms, potentially reflecting the role of stress and time constraints in exacerbating these conditions. Work-related stress has been linked to the exacerbation of functional GI disorders, such as irritable bowel syndrome (IBS), and may similarly contribute to increased symptom severity in pregnant women (28,29). This finding suggests that managing stress, perhaps through relaxation techniques or modifications in workload, could help alleviate GI complaints during pregnancy.

One of the strengths of this study is its prospective design, which allowed for the assessment of GI symptoms throughout the different trimesters of pregnancy. Additionally, the use of the validated GSRS ensured a comprehensive evaluation of symptom frequency and severity. However, there are some limitations. The study population was limited to women attending a tertiary hospital, which may not be representative of the broader pregnant population. Furthermore, while we identified several associations between lifestyle factors and GI symptoms, the study was observational, making it difficult to establish causal relationships.

CONCLUSION

This study highlights the high prevalence of GI symptoms during pregnancy and identifies several modifiable and non-modifiable risk factors. Monitoring thyroid function, managing weight gain, reducing tea consumption, and addressing work-related stress may help mitigate these symptoms. Future research should explore the underlying mechanisms linking these factors to GI symptoms and investigate the effectiveness of targeted interventions to improve maternal well-being during pregnancy.

Ethics Committee Approval: The study was approved by the Scientific Research Evaluation and Ethics Committee of Ankara Etlik City Hospital (10.01.2024, 016).

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The fifth author, Samet Kutluay ERGÖRÜN, was working at Ankara Etlik City Hospital during the study period, and relocated to a different city and currently is working at Düzce Atatürk State Hospital, which reflects his current place of employment.

REFERENCES

1. Gomes CF, Sousa M, Lourenço I, Martins D, Torres J. Gastrointestinal diseases during pregnancy: what does the gastroenterologist need to know?. Ann Gastroenterol. 2018;31(4):385-94.
2. Longo SA, Moore RC, Canzoneri BJ, Robichaux A. Gastrointestinal conditions during pregnancy. Clin Colon Rectal Surg. 2010;23(2):80-9.
3. Patrick SK, Schneider KM. Gastrointestinal disorders in pregnancy. In: Olsen M, editor. Obstetric care. Cambridge University Press; 2017. p.375-86.
4. Zielinski R, Searing K, Deibel M. Gastrointestinal distress in pregnancy: prevalence, assessment, and treatment of 5 common minor discomforts. J Perinat Neonatal Nurs. 2015;29(1):23-31.
5. Parangi S, Levine D, Henry A, Isakovich N, Pories S. Surgical gastrointestinal disorders during pregnancy. Am J Surg. 2007;193(2):223-32.
6. Boregowda G, Shehata HA. Gastrointestinal and liver disease in pregnancy. Best Pract Res Clin Obstet Gynaecol. 2013;27(6):835-53.
7. Liu C, Zhao G, Qiao D, Wang L, He Y, Zhao M, et al. Emerging progress in nausea and vomiting of pregnancy and hyperemesis gravidarum: challenges and opportunities. Front Med (Lausanne). 2022;8:809270.
8. Demirel F, Turkay Ü. The effect of inflammatory markers in the hemogram parameters of pregnant women with thyroid disease on obstetric and neonatal outcomes. Duzce Med J. 2023;25(3):231-5.
9. Alqudah M, Al-Shboul O, Al Dwairi A, Al-U´Datt DG, Alqudah A. Progesterone inhibitory role on gastrointestinal motility. Physiol Res. 2022;71(2):193-8.
10. Coquoz A, Regli D, Stute P. Impact of progesterone on the gastrointestinal tract: a comprehensive literature review. Climacteric. 2022;25(4):337-61.
11. Xiao ZL, Pricolo V, Biancani P, Behar J. Role of progesterone signaling in the regulation of G-protein levels in female chronic constipation. Gastroenterology. 2005;128(3):667-75.
12. Peña-Rosas JP, De-Regil LM, Garcia-Casal MN, Dowswell T. Daily oral iron supplementation during pregnancy. Cochrane Database Syst Rev. 2015;2015(7):CD004736.
13. Lee NM, Saha S. Nausea and vomiting of pregnancy. Gastroenterol Clin North Am. 2011;40(2):309-34, vii.
14. Biaggi A, Conroy S, Pawlby S, Pariante CM. Identifying the women at risk of antenatal anxiety and depression: A systematic review. J Affect Disord. 2016;191:62-77.
15. Nik Mazlan NAA, Mohamed Sidek AS, Zakaria AD, Zakaria Z, Yahya MM, Wan Zain WZ, et al. Proportion of colonic diverticulosis and its associated factors among patients underwent colonoscopy. Duzce Med J. 2024;26(1):9-14.
16. Kulich KR, Madisch A, Pacini F, Piqué JM, Regula J, Van Rensburg CJ, et al. Reliability and validity of the Gastrointestinal Symptom Rating Scale (GSRS) and Quality of Life in Reflux and Dyspepsia (QOLRAD) questionnaire in dyspepsia: a six-country study. Health Qual Life Outcomes. 2008;6:12.
17. Turan N, Aşt TA, Kaya N. Reliability and validity of the Turkish version of the gastrointestinal symptom rating scale. Gastroenterol Nurs. 2017;40(1):47-55.
18. Zielinski R, Searing K, Deibel M. Gastrointestinal distress in pregnancy: prevalence, assessment, and treatment of 5 common minor discomforts. J Perinat Neonatal Nurs. 2015;29(1):23-31.
19. Naumann CR, Zelig C, Napolitano PG, Ko CW. Nausea, vomiting, and heartburn in pregnancy: a prospective look at risk, treatment, and outcome. J Matern Fetal Neonatal Med. 2012;25(8):1488-93.
20. Zhang H, Wu S, Feng J, Liu Z. Risk factors of prolonged nausea and vomiting during pregnancy. Risk Manag Healthc Policy. 2020;13:2645-54.
21. Daher R, Yazbeck T, Jaoude JB, Abboud B. Consequences of dysthyroidism on the digestive tract and viscera. World J Gastroenterol. 2009;15(23):2834-8.
22. Xu GM, Hu MX, Li SY, Ran X, Zhang H, Ding XF. Thyroid disorders and gastrointestinal dysmotility: an old association. Front Physiol. 2024;15:1389113.
23. Altuwaijri M. Evidence-based treatment recommendations for gastroesophageal reflux disease during pregnancy: A review. Medicine (Baltimore). 2022;101(35):e30487.
24. Sucu ST, Karaman E, Kose C, Sucu S, Keskin HL. Is postpartum depression related to total weight gain during pregnancy and maternal anemia?. Rev Assoc Med Bras (1992). 2024;70(2):e20230908.
25. Jacobson BC, Somers SC, Fuchs CS, Kelly CP, Camargo CA Jr. Body-mass index and symptoms of gastroesophageal reflux in women. N Engl J Med. 2006;354(22):2340-8.
26. Cao H, Huang X, Zhi X, Han C, Li L, Li Y. Association between tea consumption and gastroesophageal reflux disease: A meta-analysis. Medicine (Baltimore). 2019;98(4):e14173.
27. Qian J, Chen Q, Ward SM, Duan E, Zhang Y. Impacts of caffeine during pregnancy. Trends Endocrinol Metab. 2020;31(3):218-27.
28. Huerta-Franco MR, Vargas-Luna M, Tienda P, Delgadillo-Holtfort I, Balleza-Ordaz M, Flores-Hernandez C. Effects of occupational stress on the gastrointestinal tract. World J Gastrointest Pathophysiol. 2013;4(4):108-18.
29. Sugaya N. Work-related problems and the psychosocial characteristics of individuals with irritable bowel syndrome: an updated literature review. Biopsychosoc Med. 2024;18(1):12.