



Research Article/Özgün Araştırma

The relationship between AB0 and Rh blood types and common physical complaints during pregnancy

AB0 ve Rh kan grupları ile gebelikteki olağan fiziksel rahatsızlıklar arasındaki ilişki

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Abstract

Aim: This research aimed to determine the relationship between AB0 and Rh blood types and the ordinary physical conditions in pregnancy.

Materials and methods: The research was carried out with 600 pregnant women in the third trimester between 01/10/2021 and 01/10/2022.

Results: It was determined that pregnant women of different blood types experienced different complaints and the results were significant ($p<0.05$). Similarly, when the results regarding the Rh factor were examined, it was determined that Rh(+) and Rh(-) were protective against some complaints and cause a risk for others.

Conclusion: The significant correlation between blood types and ordinary complaints during pregnancy and that women of different blood types experience different complaints can be a guide for follow-up and care according to blood types.

Keywords: AB0 blood-group system; Physical phenomena; Pregnancy; Rhesus blood-group system.

Öz

Amaç: Bu araştırma, AB0 ve Rh kan grupları ile gebelikteki olağan fiziksel rahatsızlıklar arasındaki ilişkinin belirlenmesi amacıyla yapılmıştır.

Gereç ve Yöntem: Araştırma 01.10.2021-01.10.2022 tarihleri arasında gebeliğinin üçüncü trimesterindeki 600 gebe ile gerçekleştirilmiştir.

Bulgular: Farklı kan grubundaki gebelerin farklı rahatsızlıklar yaşadığı ve sonuçların anlamlı olduğu saptandı ($p<0.05$). Benzer şekilde Rh faktörüne ilişkin sonuçlar incelendiğinde Rh(+) ve Rh(-) faktörlerinin bazı rahatsızlıklar için koruyucu bazıları içinse risk faktörü olduğu saptandı.

Sonuç: Kan gruplarıyla gebelikteki olağan rahatsızlıklar arasında anlamlı bir ilişki olması ve farklı kan gruplarının farklı rahatsızlıkları deneyimlemesi kan gruplarına göre izlem ve bakım konusunda yol gösterici olabilir.

Anahtar Kelimeler: AB0 kan grubu sistemi; Fiziksel olaylar; Gebelik; Rhesus kan-grup sistemi.

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Introduction

Studies on blood types were first started by Landois in 1875. Landsteiner and Wiener found the Rh factor which agglutinates the erythrocytes of 85% of Caucasians as a result of an experiment they conducted in 1937 using the rabbit serum immunized with the erythrocytes of a *Macacus Rhesus* monkey.¹ Blood, one of the most important substances of the human body, has four types: A, B, AB, and 0.² Additionally, the Rh system is used in the evaluation of blood types.³ The distribution of AB0 and Rh blood types varies ethnically around the world.⁴ Blood carries the genetic material of humans. Many diseases and pregnancies are detected through blood analysis.^{5,6}

Pregnancy is a special condition that brings many changes along and women experience frequent complaints during pregnancy. These complaints are classified as early and late pregnancy complaints that differ in each trimester. In the first trimester, pregnant women experience complaints such as nausea-vomiting, excessive or bitter salivation (ptyalism), frequent urination, nasal congestion, nose bleeding, increase in normal vaginal discharge (leukorrhea), gingival bleeding, fatigue, breast tenderness, and constipation. In the second trimester of pregnancy, complaints such as back pain, leg cramps, varicose vein formation, hemorrhoids, flatulence, skin itching, round ligament pain, back pain, skin changes, constipation, headache, hypotension, tachycardia, increased appetite, acid reflux, and carpal tunnel syndrome can be seen. In the third trimester of pregnancy, complaints such as respiratory distress, dyspnea, acid reflux, indigestion, edema, Braxton Hicks contractions, fatigue, and varicose may develop. The story of every pregnant woman is unique and every pregnant woman experiences specific ordinary complaints.^{7,8}

Pregnant women of different blood types have a tendency or susceptibility to different diseases or complications.⁹⁻¹² To the best of our knowledge, there is no research in the literature that has examined the effect of blood types on pregnancy complaints whereas there are studies reporting that various diseases differ

according to blood types in different patient groups.^{3,4,13-19} Similarly, we think that ordinary pregnancy complaints are more prevalent in different blood types. Therefore, we think that the results of this research will contribute to the development of individual care and treatment approaches to alleviate the ordinary symptoms of pregnancy. In this context, this research aimed to determine the relationship between AB0 and Rh blood types and normal physical complaints in pregnancy, and answers were sought to the following questions: “Do women’s blood types have an effect on ordinary pregnancy complaints?” and “Which complaints are experienced by different blood type women during pregnancy?”

Materials and Methods

Study type

This descriptive study was conducted through face-to-face interviews with 600 pregnant women in the third trimester who applied to the obstetrics and gynecology outpatient clinic of a training and research hospital of a university in western Turkey between 01/10/2021 and 01/10/2022.

Setting and samples

The population of the research consisted of pregnant women who applied to the outpatient clinic between the research dates and met the inclusion criteria of the research. All pregnant women who were willing to participate in the research were included in the research without choosing any sampling method. Since there is no similar research in the literature, the minimum number of participants to be included in the sample was determined as 299 using the Chi-square analysis in G-Power 3.1.3 with an effect size of $w=0.2$ (low effect), a confidence interval of 80%, an alpha of $\alpha=0.05$, $df:4$, a power of 80%.^{20,21} Considering the risk of data loss in the research, 330 participants were invited to the research, approximately 10% more than the sample size. This number was increased in order to ensure homogeneity between blood types and the research was completed with 600 participants. A and B blood types were encountered more than 0 and AB blood types, and data collection from A and B blood types was terminated in order to ensure homogeneity between blood

types. Data from 0 and AB blood types were collected until a sufficient number was reached. There was no data selection in the Rh group. All pregnant women who were aged 18 or over, who had no communication problems, who were expecting a healthy baby, who did not have any risk in terms of pregnancy, who were in the third trimester of the pregnancy, and who were willing and able to participate in the research would be included. In addition, pregnant women from all trimesters who agreed to participate in the research were invited.

Data collection tools

Pregnant information form: Pregnant information form was prepared by the researcher and consists of 9 questions regarding sociodemographic characteristics, blood types, obstetric characteristics, and the complaints they experienced during pregnancy. List of common physical complaints during pregnancy: This list, in which ordinary complaints seen during pregnancy are specified, was used in the research of Çetin et al.⁸ and includes 25 complaints that can be experienced during pregnancy.

Procedures

In the research, detailed information was given to the pregnant women and the scope of the research was explained in plain language. Interviews with pregnant women were held in a suitable room in the hospital and took approximately 15 minutes. The blood types of the pregnant women were recorded based on their instruction and by examining their health records.

Statistical analysis

The research data were analyzed using the IBM SPSS Statistics 22 program. Numerical analyses such as number, mean, standard deviation and percentage were used in the analysis of the data and the chi-square test was used to determine the relationship between variables.

Ethical considerations

Throughout the research, the Declaration of Helsinki of Human Rights was adhered to. The

purpose and benefits of the research and the participants' roles in the research were explained to the pregnant women who participated in the research. Oral and written informed consent was obtained from the pregnant women by paying attention to their willingness and voluntariness to participate in the research. Permission was taken from the obstetrics and gynecology outpatient clinic of the university hospital where the research data were collected and the head physician of the hospital. In addition, ethical approval for the research was taken from the ethics committee of the Kütahya Health Science University (No:E-41997688-050.99-23293; Date: 17.09.2021).

Results

The mean age of the pregnant women participating in the research was 27.96 ± 4.77 and the mean gestational week was 32.30 ± 6.45 . The majority of the pregnant women (47.0%) were high school graduates. Most of the pregnant women's (37.0%) pregnancies were their first pregnancies and most of them (76.8%) had not experienced abortion before. A significant rate of pregnant women (87.3%) had planned their pregnancies. A vast majority of the pregnant women (85.8%) did not exercise. 36.8% of the pregnant women consumed vegetables and fruits whereas 35.2% consumed legumes. In addition, more than half of the pregnant women (66.8%) stated that the spousal-family support they received was sufficient (Table 1).

According to AB0 blood types, 154 of the pregnant women had A blood type; 152 had B blood type; 148 had AB blood type; 146 had 0 blood type. When the relationship between the AB0 blood types and ordinary complaints of the pregnant women during pregnancy was examined, there were significant results according to the blood types. In the comparison between the pregnant women of A blood type and the pregnant women of other blood types, they experienced more complain such as feeling of bloating in stomach, cracks in the skin and leg cramps ($p < 0.01$). When compared to women of other blood types, women of B blood type experienced hemorrhoids, headaches, and gingival bleeding more ($p < 0.01$) (Table 2).

Table 1. Distribution of pregnant women regarding their characteristics (N=600)

Feature	n	%
Educational status		
Primary school	95	15.8
High school	282	47.0
University	223	32.7
Gravida		
1	222	37.0
2	186	31.0
3 and more	192	32.0
Abortion		
No	461	76.8
1	106	17.7
2 and more	33	5.5
The planned state of pregnancy		
Yes	524	87.3
No	76	12.7
Exercising		
Yes	85	14.2
No	515	85.8
The most commonly consumed food group		
Vegetables and fruit	221	36.8
Fast-food	44	7.3
Dry beans	211	35.2
Meat group	124	20.7
Partner-family support		
Enough supported	401	66.8
Partially supported	115	19.2
Not enough supported	84	14.0

When compared to pregnant women of other blood types, pregnant women of AB blood type experienced hand-foot swelling and breast tenderness more ($p<0.01$). When compared to women of other blood types, pregnant women of 0 blood type experienced increased appetite, frequent urination, insomnia, sour stomach, vomiting and nausea more ($p<0.01$). There was no significant difference between the other ordinary complaints during pregnancy and AB0 blood types ($p>0.05$) (Table 2). According to the Rh factor, 287 of the pregnant women had Rh-factor and 313 had Rh+ factor. When the relationship between the ordinary complaints during pregnancy and the Rh factor was examined, there were significant results according to the types. Pregnant women with Rh+ factor experienced dizziness, gingival bleeding, cracks in the skin, headache, insomnia, sour stomach, and fatigue more ($p<0.01$). Women with Rh- factor experienced increased appetite, constipation and hemorrhoids more ($p<0.01$). There was no

significant difference between the other ordinary complaints during pregnancy and the Rh factor ($p>0.05$) (Table 3).

Discussion

As a result of our research, it was seen that there were significant differences in pregnant women of different blood types in terms of ordinary complaints that can be seen during pregnancy. On the other hand, there is no relevant research in the literature. However, some studies have proven that different blood types are at greater risk for certain complaints during pregnancy. Furthermore, there was evidence that blood types may be effective in the occurrence and outcomes of diseases in different patient groups. Although no similar research was reached, the evidence revealing that blood types can be effective on diseases suggested that it is important to consider this issue in terms of blood types. In this section, the importance of the subject will be discussed, and the results of our research and studies that have examined the effect of blood types in

pregnant women and different patient groups will be addressed.

Table 2. Distribution of usual physical complaints during pregnancy according to AB0 blood groups and differences between groups.

Complaints		A group (n=154)		B group (n=152)		AB group (n=148)		0 group (n=146)		χ^2^{\ddagger}
		n	%	n	%	n	%	n	%	p
Pyrosis	Happened	89	57.8	87	57.2	100	67.6	79	54.1	$\chi^2=6.224$
	Didn't happen	65	42.2	65	42.8	48	32.4	67	45.9	$p=0.101$
Dizziness	Happened	96	62.3	96	63.2	75	50.7	91	62.3	$\chi^2=6.628$
	Didn't happen	58	37.7	56	36.8	73	49.3	55	37.7	$p=0.085$
Hot flashes	Happened	93	60.4	85	55.9	79	53.4	85	58.2	$\chi^2=1.675$
	Didn't happen	61	39.6	67	44.1	69	46.0	61	41.8	$p=0.643$
Constipation	Happened	114	74.0	99	65.1	101	68.2	99	67.8	$\chi^2=3.002$
	Didn't happen	40	26.0	53	34.9	47	31.8	47	32.2	$p=0.391$
Hemorrhoids	Happened	85	55.2	138	90.8	92	62.2	91	62.3	$\chi^2=52.045$
	Didn't happen	69	44.8	14	9.2	56	37.8	55	37.7	$p=0.000$
Hand-foot swelling	Happened	64	41.6	89	58.6	96	64.9	67	45.9	$\chi^2=21.258$
	Didn't happen	90	58.4	63	41.4	52	35.1	79	54.1	$p=0.000$
Back pain	Happened	80	51.9	77	50.7	89	60.1	87	59.6	$\chi^2=4.506$
	Didn't happen	74	48.1	75	49.3	59	39.9	59	40.4	$p=0.212$
Respiratory distress	Happened	96	62.3	83	54.6	96	64.9	95	65.1	$\chi^2=4.591$
	Didn't happen	58	37.7	69	45.4	52	35.1	51	34.9	$p=0.204$
Increased appetite	Happened	71	46.1	92	60.5	89	60.1	124	84.9	$\chi^2=49.696$
	Didn't happen	83	53.9	60	39.5	59	39.9	22	15.1	$p=0.000$
Decreased appetite	Happened	125	81.2	114	75.0	107	72.3	114	78.1	$\chi^2=3.724$
	Didn't happen	29	18.8	38	25.0	41	27.7	32	21.9	$p=0.293$
Leg cramps	Happened	119	77.3	82	53.9	82	55.4	81	55.5	$\chi^2=24.036$
	Didn't happen	35	22.7	70	46.1	66	44.6	65	44.5	$p=0.000$
Gingival bleeding	Happened	32	20.8	41	27.0	17	11.5	28	19.2	$\chi^2=11.548$
	Didn't happen	122	79.2	111	73.0	131	88.5	118	80.8	$p=0.009$
Cracks in the skin	Happened	135	87.7	84	55.3	65	43.9	108	74.0	$\chi^2=75.484$
	Didn't happen	19	12.3	68	44.7	83	56.1	38	26.0	$p=0.000$
Sweating	Happened	104	67.5	97	63.8	102	68.9	92	63.0	$\chi^2=1.615$
	Didn't happen	50	32.5	55	36.2	46	31.1	54	37.0	$p=0.656$
Weakness	Happened	97	63.0	94	61.8	78	52.7	77	52.7	$\chi^2=5.817$
	Didn't happen	57	37.0	58	38.2	70	47.3	69	47.3	$p=0.121$
Fatigue	Happened	91	59.1	95	62.5	81	54.7	83	56.8	$\chi^2=2.045$
	Didn't happen	63	40.9	57	37.5	67	45.3	63	43.2	$p=0.563$
Frequent urination	Happened	91	59.1	78	51.3	69	46.6	87	59.6	$\chi^2=48.275$
	Didn't happen	63	40.9	74	47.8	79	53.4	59	40.4	$p=0.000$
Nausea	Happened	75	48.7	107	70.4	102	68.9	127	87.0	$\chi^2=51.365$
	Didn't happen	79	51.3	45	29.6	46	31.1	19	13.0	$p=0.000$
Breast tenderness	Happened	101	65.6	84	55.3	126	85.1	93	63.7	$\chi^2=32.482$
	Didn't happen	53	34.4	68	44.7	22	14.9	53	36.3	$p=0.000$
Headache	Happened	52	33.8	96	63.2	86	58.1	86	58.9	$\chi^2=32.761$
	Didn't happen	102	66.2	56	36.8	62	41.9	60	41.1	$p=0.000$
Leukorrhea	Happened	98	63.6	86	56.6	75	50.7	81	55.4	$\chi^2=5.924$
	Didn't happen	56	36.4	66	43.4	73	49.3	65	44.5	$p=0.151$
Insomnia	Happened	65	42.2	61	40.1	53	35.8	87	59.6	$\chi^2=19.494$
	Didn't happen	89	57.8	91	59.9	95	64.2	59	40.4	$p=0.000$
Sour stomach	Happened	58	37.7	24	15.8	45	30.4	76	52.1	$\chi^2=45.546$
	Didn't happen	96	62.3	128	84.2	103	69.6	70	47.9	$p=0.000$
Feeling of bloating in stomach	Happened	112	72.7	104	68.4	76	51.4	89	61.0	$\chi^2=17.076$
	Didn't happen	42	27.3	48	31.6	72	48.6	57	39.0	$p=0.001$
Vomiting	Happened	115	74.7	108	71.1	101	68.2	121	82.9	$\chi^2=9.281$
	Didn't happen	39	25.3	44	28.9	47	31.8	25	17.1	$p=0.026$

[‡]Chi-square Test

Table 3. Distribution of usual physical complaints during pregnancy according to Rh blood groups and differences between groups.

Complaints		Rh (+) (n=313)		Rh (-) (n=287)		χ^2 [‡]
		n	%	n	%	p
Pyrosis	Happened	183	58.5	172	59.9	$\chi^2=0.133$
	Didn't happen	130	41.5	115	40.1	$p=0.716$
Dizziness	Happened	204	65.2	154	53.7	$\chi^2=8.252$
	Didn't happen	109	34.8	133	46.3	$p=0.004$
Hot flashes	Happened	188	60.1	154	53.7	$\chi^2=2.506$
	Didn't happen	125	39.9	133	46.3	$p=0.113$
Constipation	Happened	220	70.3	233	81.2	$\chi^2=9.611$
	Didn't happen	93	29.7	54	18.8	$p=0.002$
Hemoroid	Happened	208	66.5	248	86.4	$\chi^2=32.693$
	Didn't happen	105	33.5	39	13.6	$p=0.000$
Hand-foot swelling	Happened	163	52.1	153	53.3	$\chi^2=0.091$
	Didn't happen	150	47.9	134	46.7	$p=0.762$
Back pain	Happened	178	56.9	155	54.0	$\chi^2=0.497$
	Didn't happen	135	43.1	132	46.0	$p=0.481$
Respiratory distress	Happened	183	58.5	187	65.2	$\chi^2=2.835$
	Didn't happen	130	41.5	100	34.8	$p=0.092$
Increased appetite	Happened	175	55.9	201	70.0	$\chi^2=12.767$
	Didn't happen	138	44.1	86	30.0	$p=0.000$
Decreased appetite	Happened	243	77.6	217	75.6	$\chi^2=0.344$
	Didn't happen	70	22.4	70	24.4	$p=0.558$
Leg cramps	Happened	183	58.5	181	63.1	$\chi^2=1.327$
	Didn't happen	130	41.5	106	36.9	$p=0.249$
Gingival bleeding	Happened	81	25.9	37	12.9	$\chi^2=15.982$
	Didn't happen	232	74.1	250	87.1	$p=0.000$
Cracks in the skin	Happened	217	69.3	175	61.0	$\chi^2=4.613$
	Didn't happen	96	30.7	112	39.0	$p=0.032$
Sweating	Happened	211	67.4	184	64.1	$\chi^2=0.725$
	Didn't happen	102	32.6	103	35.9	$p=0.394$
Weakness	Happened	185	59.1	161	56.1	$\chi^2=0.555$
	Didn't happen	128	40.9	126	43.9	$p=0.456$
Fatigue	Happened	239	76.4	163	56.8	$\chi^2=25.916$
	Didn't happen	74	23.6	124	43.2	$p=0.000$
Frequent urination	Happened	191	61.0	170	59.2	$\chi^2=0.200$
	Didn't happen	122	39.0	117	40.8	$p=0.655$
Nausea	Happened	204	65.2	180	62.7	$\chi^2=0.393$
	Didn't happen	109	34.8	107	37.3	$p=0.531$
Breast tenderness	Happened	203	64.9	168	54.5	$\chi^2=2.534$
	Didn't happen	110	35.1	119	41.5	$p=0.111$
Headache	Happened	186	59.4	134	46.7	$\chi^2=9.756$
	Didn't happen	127	40.6	153	53.3	$p=0.002$
Leukorrhea	Happened	186	59.4	154	53.7	$\chi^2=0.133$
	Didn't happen	127	40.6	133	46.3	$p=0.716$
Insomnia	Happened	183	58.5	83	28.9	$\chi^2=52.962$
	Didn't happen	130	41.5	204	71.1	$p=0.000$
Sour stomach	Happened	165	52.7	38	13.2	$\chi^2=104.217$
	Didn't happen	148	47.3	249	86.0	$p=0.000$
Feeling of bloating in stomach	Happened	193	61.7	188	65.5	$\chi^2=0.956$
	Didn't happen	120	38.3	99	34.5	$p=0.329$
Vomiting	Happened	238	76.0	207	72.1	$\chi^2=1.196$
	Didn't happen	75	24.0	80	27.9	$p=0.274$

[‡]Chi-square Test

In the literature review on the subject, it was seen that the prevalence of gestational diabetes is different in pregnant women with different blood types. In a research, it has been observed that gestational diabetes was more common in pregnant women of A blood type.^{11,22} On the other hand, other studies have evidenced that the risk of gestational diabetes was higher in women of AB blood type.^{23,24} It has also been proven that women with Rh+ factor were more likely to experience gestational diabetes.²⁴ Increasing the number of relevant studies may provide more clear results in terms of conflicting results between studies.

Another subject in which the effect of blood types on complaints experienced during pregnancy was examined was preeclampsia. In a research, it has been reported that the risk of preeclampsia increased in women of O blood type compared to women of other blood types.^{10,12} On the other hand, the results of another research have shown that women of AB blood type experienced preeclampsia and severe preeclampsia more.^{9,25} It has been reported that O blood type is a protective factor for gestational hypertensive disorders.⁹ Further studies on pregnant women in larger populations may provide more evidence.

Another issue addressed regarding blood types was postpartum hemorrhage. In a research, it has been found that women of O blood type were more prone to postpartum hemorrhage.¹² On the other hand, in a research in which 4516 women who gave birth were examined, no significant correlation was determined between the O blood type and the Rh factor and postpartum hemorrhage.¹⁶ Other issues discussed regarding the effect of blood types were placental malaria and helicobacter pylori infection in pregnant women. It has been determined that pregnant women of B blood type were at risk for experiencing placental malaria and that O blood type was a protective factor for placental malaria.²⁶ In another research, it has been determined that helicobacter pylori infection was more common in pregnant women of O blood type.²⁷ Although these studies have been conducted on pregnant women, it is thought that more in-depth genetic studies on the effect of blood

types are needed. By this way, it may be possible to obtain more definitive evidence.

According to previous studies conducted with different patient groups, blood types can be a risk factor for diseases. Based on the evidence that blood types can be effective on psychological variables, people of AB blood type may be more prone to psychiatric diseases.²⁸ In another research, it has been reported that the stress level was higher in individuals of AB blood type.² Another subject that was discussed in the literature was cancer. It has been reported that non-O blood type women had ovarian cancer more, whereas women of A blood type had an increased risk of pre-menopause ovarian cancer.¹⁴ In patients with pancreatic cancer, it is known that the survival rates of individuals of A blood type are worse.¹³ It has also been stated that there is a relationship between blood types and abdominal obesity and Type 2 diabetes.^{3,15} Although these studies were conducted with different patient groups and conditions, they have provided evidence regarding the effect of blood types on different diseases.

Various studies conducted with adults have shown that blood types play an important role in many diseases. In a research examining the relationship between morbidities and ABO blood types in premature infants, 1785 preterm newborns born before the 32nd gestational week with a birth weight below 1500 grams were examined. The incidence of patent ductus arteriosus and bronchopulmonary dysplasia was higher in infants of A blood type.¹⁵ Previous studies on the subject have shown that blood type can be a risk factor or a protective factor in individuals with different demographic characteristics and disease groups.

Research strengths and limitations

To the best of our knowledge, this study was the first study on the subject, being a strength of the study. However, an important limitation of the study was that the study was conducted at a single center and in an outpatient clinic of a secondary care hospital. Furthermore, the diversity of blood types varies in different geographical regions and races, therefore, the results of the study cannot be generalized

worldwide, constituting another limitation. Therefore, we think that it is important to conduct future studies with larger and more diverse samples. In addition, another limitation of the study was that a valid and reliable measurement tool was not used in the study, but this study may provide evidence for future studies on the subject.

Conclusion

Our research showed that there may be a significant relationship between blood types and ordinary physical complaints during pregnancy. More in-depth epidemiological and genetic studies are necessary to confirm our research results. These findings may guide new studies to examine the relationship between blood types and ordinary complaints that women may experience during their pregnancy. Moreover, new evidence on the subject can help health professionals in risk determination related to ordinary physical complaints during pregnancy, care, and follow-up in terms of blood types. Finally, in the future, the study can be evaluated with valid and safe measurement tools and according to pregnancy trimesters.

Ethics Committee Approval

Ethical approval for the research was taken from the ethics committee of the Kütahya Health Science University (No:E-41997688-050.99-23293; Date: 17.09.2021). Throughout the research, the Declaration of Helsinki of Human Rights was adhered to.

Informed Consent

Permission was taken from the obstetrics and gynecology outpatient clinic of the university hospital where the research data were collected and the head physician of the hospital. In addition, written permission was obtained from the Kütahya provincial health directorate. Written and verbal consents were obtained from all pregnant women participating in the study.

Authors Contributions

Study design: ETÇ, FÇC; Data collecting: ETÇ; Data analysis: ETÇ, FÇC; Writing: ETÇ, FÇC; Critical review: ETÇ, FÇC.

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Conflict of Interest

There is no conflict of interest between any relevant persons or institutions.

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Statements

This study has not been presented anywhere before.

Peer-review

Externally peer-reviewed.

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