

ORIGINAL ARTICLE

Özgün Araştırma

Correspondence address
Yazışma adresi

Sule ATALAY MERT
Ankara Etlik City Hospital,
Gynecology and Obstetrics Clinic,
Ankara, Türkiye
drsuleatalay@hotmail.com

Geliş tarihi / Received : December 09, 2023
Kabul Tarihi / Accepted : February 19, 2024
E-Yayın Tarihi / E-Published : September 01, 2024

Cite this article as

Bu makalede yapılacak atıf

Atalay Mert S., Kinay T., Kurt A., Ozgurluk I., Keskin HL.

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Akd Med J 2024;10(3): 558-563

Sule ATALAY MERT
Ankara Etlik City Hospital,
Gynecology and Obstetrics Clinic,
Ankara, Türkiye
ORCID ID: 0000-0002-5711-3933

Tugba KINAY
Ankara Etlik City Hospital,
Gynecology and Obstetrics Clinic,
Ankara, Türkiye
ORCID ID: 0000-0001-5340-1025

Ahmet KURT
Ankara Etlik City Hospital,
Gynecology and Obstetrics Clinic,
Ankara, Türkiye
ORCID ID: 0000-0001-8402-5675

Izzet OZGURLUK
Ankara Etlik City Hospital,
Gynecology and Obstetrics Clinic,
Ankara, Türkiye
ORCID ID: 0000-0002-9553-9265

Huseyin Levent KESKIN
Ankara Etlik City Hospital,
Gynecology and Obstetrics Clinic,
Ankara, Türkiye
ORCID ID: 0000-0002-2268-3821

The Effect of Antenatal Education and Pregnancy Exercises on Delivery Outcomes

Antenatal Eğitim ve Gebelik Egzersizlerinin Doğum Sonuçları Üzerine Etkisi

ABSTRACT

Objective:

To assess the impact of pregnancy school training and exercises on obstetric outcomes in a tertiary center.

Material and Methods:

We conducted a retrospective evaluation of pregnant women who participated in pregnancy school exercises between January and April 2023 and had term deliveries. These pregnant women received theoretical education, relaxation, and breathing exercises. Pregnant women who did not attend the pregnancy school were included in the control group.

Results:

In the study group, we evaluated 175 pregnant women who attended prenatal education, while the control group consisted of 175 pregnant women who did not attend prenatal education. The rate of nulliparous patients was 74.9% (n = 131) in the study group and 56.6% (n = 99) in the control group (p < 0.001). The rate of oxytocin augmentation was 28.6% (n = 50) in the study group and 46.9% (n = 82) in the control group (p < 0.001). The episiotomy rate was lower in the study group 41.7% (n = 73) compared to the control group 54.9% (n = 96), p = 0.014, and the cesarean section rate was also lower in the study group compared to the control group (p = 0.024).

Conclusion:

Pregnant women who regularly attend pregnancy school in the early weeks experience a significant reduction in the need for episiotomies, oxytocin supplements, and cesarean section rates. These positive outcomes are attributed to the benefits of pelvic floor exercises. Therefore, we recommend encouraging all pregnant women to participate in pregnancy school training in the early weeks to support natural birthing processes.

Key Words:

Antenatal education, pregnancy exercises, cesarean section, vaginal delivery, pregnancy education school

ÖZ

Amaç:

Tersiyer bir merkezdeki gebe okulu teorik eğitimleri ve egzersizlerinin obstetrik sonuçlara etkisinin değerlendirilmesidir.

Gereç ve Yöntemler:

Tersiyer bir merkezdeki Ocak 2023-Nisan 2023 tarihleri arasında gebe okulu teorik ve egzersiz eğitimlerine katılmış, miadında doğumu gerçekleştiren gebelerin sonuçları retrospektif olarak değerlendirildi. Geçirilmiş uterin cerrahi öyküsü olan, vajinal yolla doğuma engel durumu olan, fetal malprezantasyonu bulunan gebeler çalışma dışında bırakıldı. Gebelere teorik eğitim, gevşeme egzersizleri, pelvik taban kontrolü için nefes-plates egzersizleri yaptırıldı. Kontrol grubuna ise gebe okuluna katılmamış miadında doğum yapan gebeler dahil edildi.

Bulgular:

Çalışmada eğitime katılan 175 gebe çalışma grubu ve antenatal eğitime katılmayan 175 gebe kontrol grubu olmak üzere toplam 350 gebe değerlendirildi. Hastaların yaş ortalaması çalışma grubunda $27,89 \pm 4,85$, kontrol grubunda $26,53 \pm 5,50$ olarak bulundu ($p = 0,016$). Nullipar hasta oranı çalışma grubunda %74,9 ($n = 131$) iken kontrol grubunda %56,6 ($n = 99$) idi ($p < 0,001$). Çalışma grubunda oksitosinle augmentasyon oranı % 28,6 ($n = 50$) iken kontrol grubunda %46,9 ($n = 82$) idi ($p < 0,001$). Çalışma grubunda epizyotomi oranı (sırasıyla %41,7 ($n = 73$), %54,9 ($n = 96$), $p = 0,014$) ve sezaryen doğum oranı (sırasıyla %24 ($n = 42$), %34,9 ($n = 61$), $p = 0,024$) kontrol grubundan daha düşük idi.

Sonuç:

Gebe okulu eğitimlerine sıklıkla hiç doğum yapmamış gebelerin katıldığı, ayrıca düzenli olarak erken haftalarda katılan gebelerde pelvik taban egzersizleri ve ağrı yönetimi sayesinde epizyotomi ihtiyacı, oksitosin takviyesi ve sezaryen oranlarında anlamlı azalma görüldü. Bu nedenle tüm gebelerin uygun merkezlerde sadece psikolojik hazırlık için değil doğal ve müdahalesiz doğum süreçleri için de erken haftalardan itibaren düzenli olarak gebe okulu eğitimlerine katılmaları teşvik edilmelidir.

Anahtar Kelimeler:

Antenatal eğitim, gebe egzersizleri, sezaryen doğum, vajinal doğum, gebe okulu

INTRODUCTION

Pregnancy, childbirth, and the postnatal period are normal physiological processes, but they require increased healthcare attention. Antenatal training and exercises are designed to ensure a healthy pregnancy for both the mother and the fetus, a controlled delivery process, and proper postpartum care (1, 2). According to the World Health Organization (WHO), 68% of women in developing countries and 98% of women in developed countries receive

antenatal care (3). In our country, the Ministry of Health has officially included postpartum preparation education in its services through a circular on "Pregnancy School, Pregnancy Information Class, Postpartum Preparation, and Counseling Centers"(4).

The mode of delivery varies worldwide, depending on medical indications and the mother's social and psychological status. Publications support the rapid increase in mothers' preferences for cesarean sections over the last 20 years, both globally and in Turkey, except for medical reasons. According to the WHO, the ideal cesarean section rate should range between 10 and 15% (5, 6). To address the rising cesarean section rates in Turkey and promote a healthier birthing process and postpartum period, theoretical antenatal education, regular exercise, and counseling services are offered to pregnant women, with training certificates provided (3). Our study aimed to investigate whether the increased awareness of pregnant women who received theoretical antenatal education about the birthing process at the pregnancy school and engaged in regular exercises had any impact on the rates of episiotomy, oxytocin augmentation, delivery methods, and neonatal outcomes.

MATERIAL and METHOD

We conducted our study in accordance with the Declaration of Helsinki and relevant regulations issued by the Ministry of Health of the Republic of Turkey. The study received approval from the "Ankara Etlik City Hospital Ethics Committee" on August 9, 2023 (No. 450). We conducted a retrospective analysis of data from pregnant women who participated in both theoretical and exercise training at a tertiary center between January 1, 2023, and April 1, 2023, with expected due dates around July 15. We included pregnant women who attended a total of 5 weeks of training, comprising 30 minutes of theoretical instruction and 30 minutes of exercise, at least once.

In the control group, we assessed patients who had not attended the pregnancy school, had not participated in exercise programs, but had experienced term pregnancies and deliveries at our center. We excluded pregnant women with a history of uterine surgery, systemic diseases that could impede vaginal delivery (e.g., epilepsy, advanced myopia, respiratory or cardiac conditions), or fetal malpresentation. We also excluded those for whom data was inaccessible or who continued their follow-up at another center or gave birth elsewhere. During the training, pregnant women received theoretical information on pregnancy physiology, nutrition, postpartum neonatal care, and breastfeeding. They also engaged in relaxation, breathing, and pelvic exercises to prepare for childbirth. The control group consisted of pregnant women who did not attend the pregnancy school and gave birth at the same center. We gathered data from the participants' records, including age, last menstrual period, any fetal or maternal complications, history of uterine surgery, systemic diseases,

oxytocin augmentation, week of delivery, delivery indications, delivery mode, birth weight, Apgar scores at 1 and 5 minutes, episiotomy, and attendance details for pregnancy school classes.

Antenatal Education and Exercise Program

In the pregnancy school, a four-week theoretical training program covered topics such as pregnancy anatomy, physiology, screening tests, nutrition, psychology, self-care, birth mechanisms, pain management, exercises for childbirth, breastfeeding, and family planning.

After the 20th week of pregnancy, physiotherapists guided the participants in a 30-minute exercise program conducted three times a week, following the theoretical training. It involved warm-ups, relaxation exercises, breathing techniques, pelvic floor exercises, plate exercises, and cooling exercises. Massaging the abdominal and sacral regions during labor was recommended for pain relief. The breathing exercises aimed to provide oxygen to both the mother and the baby during childbirth while minimizing the perception of pain.

Statistics

A power analysis indicated that we required 175 cases in each group to achieve a standard effect size of 0.39, a 5% margin of error, and 95% power. We conducted statistical analyses using IBM SPSS 26.0 software. Continuous variables were analyzed using an independent T-test, and categorical variables were examined with the chi-square test. A p-value less than 0.05 was considered statistically significant. Frequencies were described with percentages.

RESULTS

Between January and April 2023, out of the 465 pregnant women who attended the pregnancy school, we excluded 115 individuals, constituting 24.7% of the total. The exclusions comprised pregnant women who were still expecting 14.8%, those with fetal malpresentation 3.22%, or those with a history of prior uterine surgery 3.01%. This resulted in a remaining total of 350 pregnant women for our study, evenly divided into two groups: 175 in the study group (those who received antenatal education) and 175 in the control group (those who did not). The average age of patients in the study group was 27.89 ± 4.85 , while in the control group, it was 26.53 ± 5.50 . The study group was composed of 74.9% nulliparous patients, while the control group had 56.6%. Gravida, parity, and the number of living children were all significantly lower in the study group, demographical data were detailed in Table I ($p < 0.001$).

There was no significant age difference between pregnant women who delivered vaginally (28.1 ± 5.03) and those who underwent cesarean sections (27.1 ± 4.15), $p = 0.237$. The study group had a lower rate of oxytocin augmentation 28.6% ($n = 50$) compared to the control group 46.9% ($n = 82$), $p = 0.001$. The episiotomy rate was also lower in

the study group 41.7% ($n = 73$) compared to the control group 54.9% ($n = 96$), $p = 0.014$. Cesarean section rates were significantly lower in the study group 24% ($n = 42$) compared to the control group 34.9% ($n = 61$), $p = 0.024$. It was detailed in Table I.

Table I. Comparison of sociodemographic characteristics of the study and control groups

	Study Group (N=175) Mean \pm Std. Dev.	Control group (N=175) Mean \pm Std. Dev.	p value
Age	27.89 \pm 4.85	26.53 \pm 5.50	0.016*
Gravida	1.58 \pm 0.90	2.07 \pm 1.50	<0.001*
Parity	0.34 \pm 0.64	0.84 \pm 1.32	<0.001*
Number of Abortions	0.19 \pm 0.49	0.22 \pm 0.60	0.625
Number of Living Children	0.34 \pm 0.64	0.82 \pm 1.35	<0.001*
Birth Week	39.12 \pm 1.44	39.24 \pm 1.27	0.423
Augmentation with Oxytocin (N,%)	50 (28.6%)	82 (46.9%)	<0.001*
Episiotomy (N, %)	73 (41.7%)	96 (54.9%)	0.014*
Mode of Birth (N, %)			
Vaginal Birth	133 (76%)	114 (65.1%)	0.024*
Caesarean section	42 (24%)	61 (34.9%)	
Birth Weight	3300.43 \pm 466.24	3305.26 \pm 419.57	0.919
Apgar 1	8.80 \pm 0.83	8.81 \pm 0.50	0.876
Apgar 5	9.82 \pm 0.82	9.90 \pm 0.32	0.267

Mean: average, Std. Dev: standard deviation

Data presented as mean \pm standard deviation or number (percentage)

There was no significant age difference between pregnant women who delivered vaginally (28.1 ± 5.03) and those who underwent cesarean sections (27.1 ± 4.15) ($p = 0.237$). The study group had a lower rate of oxytocin augmentation (28.6%) compared to the control group (46.9%) ($p = 0.001$). The episiotomy rate was also lower in the study group (41.7%) compared to the control group (54.9%) ($p = 0.014$). Cesarean section rates were significantly lower in the study group (24%) compared to the control group (34.9%) ($p = 0.024$).

When evaluating neonatal APGAR scores, birth weights, and birth weeks, no significant differences were found between the two groups. Notably, all 15 pregnant women excluded from the study due to cesarean sections for fetal malpresentation had reached at least 32 weeks of pregnancy (the 3rd trimester) and had attended pregnancy school education and exercises, but only a few times.

Regarding participation in the pregnancy school, 4% of pregnant women started in the 1st trimester, 17% in the 2nd trimester, and 78.85% in the 3rd trimester. Only 9.71% participated with their partners. Pregnant women who attended three or more training sessions had significantly lower rates of cesarean sections, episiotomies, and oxytocin augmentation. It was observed that 86% of pregnant women who received oxytocin augmentation started the training in the 3rd trimester. The details are summarized in Table II.

Table II. Comparison of Participation in Antenatal Education and Obstetric Outcomes

Education	Number of	Episiotomy	Oxytocin	Vaginal	Caesarean
Number of	Pregnant	Application	Augmentation	Birth	section
Participation	Women	(N, %)	Application	(N,%)	(N,%)
	Attending		(N, %)		
	the				
	Training				
	(N, %)				
1.00	47 (26.9%)	19 (26.14%)	18 (36%)	25 (18.7%)	21 (50%)
2.00	64 (36.6%)	23 (31.5%)	32 (64%)	46 (34.5%)	21 (50%)
3.00	33 (18.9%)	23 (31.5%)	0	29 (21.8%)	0
4.00	23 (13.1%)	7 (9.5%)	0	24 (18%)	0
5.00	8 (4.6%)	1(1.36%)	0	9 (6.7%)	0
Total	175 (100%)	73 (41.7%)	50 (28.5%)	133 (76%)	42 (24%)

All frequencies were given as %.

DISCUSSION

In recent years, the importance of antenatal training has grown significantly, aligning with the Ministry of Health's policies for promoting a healthy birth and postpartum process as well as the World Health Organization's recommended cesarean section rates. Our study has demonstrated that antenatal education and pregnancy exercises have played a pivotal role in reducing cesarean section rates, minimizing the need for episiotomies, and decreasing the requirement for oxytocin augmentation. Additionally, these programs have notably increased the awareness of expectant mothers regarding the childbirth process.

According to the 2018 Turkey Demographic and Health Survey (TDHS) data (7), the cesarean section rate in Turkey stands at 52%, with 38% of these being planned in advance. This highlights the preference of pregnant women in Turkey for private health institutions over public hospitals for childbirth. In our study, we observed that 74.9% of nulliparous pregnant women attended the pregnancy school, resulting in a cesarean section rate of 24% among those who received antenatal education.

Therefore, gravidity, parity, and the number of living children were statistically higher in the control group ($p < 0.001$). This was attributed to the increased participation in the pregnancy school by nulligravid patients due to concerns about the birthing process.

A study assessing the mode of delivery following antenatal education found a significantly lower cesarean section rate of 34.9% ($n = 15$), in contrast to 67.4% ($n = 29$) in the control group. This decrease in cesarean section rates remained consistent across all age groups, emphasizing the benefits of antenatal education for expectant mothers of various ages (8). In our study, the mean age of pregnant women who delivered vaginally was 28.1 ± 5.03 years, and the mean age of pregnant women who delivered by cesarean section was 27.1 ± 4.15 years. No significant difference was observed between age and mode of delivery, and antenatal education was found to be beneficial for all age groups.

Another study reported a vaginal delivery rate of 60% in the antenatal education group, compared to 41.7% in the control group, with no significant variations observed among age groups (9). In our study, the vaginal delivery rate was 76% ($n = 133$), compared to 65.1% ($n = 114$) in the control group ($p = 0.024$).

In contrast, a study conducted on similar age groups found that antenatal education did not significantly affect the type of delivery. It only increased psychosocial support intake and did not affect physical experiences (10).

In a study on episiotomy, which is one of the birth process interventions, it was observed that 45.6% of vaginal deliveries had an episiotomy and 30% of vaginal deliveries were delivered by cesarean section after training (11). However, our study demonstrated a substantial impact on reducing both episiotomy rates (41.7%) and cesarean section rates (24%), particularly among those who participated in pregnancy school training three times or more. When analyzing oxytocin augmentation in our study, the overall rate was 24%, while it was 0% for pregnant women who attended antenatal training three times or more. This suggests that pelvic exercises make the pelvis more conducive for labor. Additionally, some studies in the literature have highlighted the positive effects of pilates training, not only in reducing the need for episiotomies and oxytocin augmentation but also in enhancing psychological well-being (12).

Our study does have limitations, primarily due to its retrospective nature and the scarcity of comparative studies in the existing literature. Therefore, more prospective studies with larger sample sizes are necessary to further explore these findings.

CONCLUSION

In conclusion, antenatal training and pregnancy exercises represent valuable tools for helping pregnant women manage labor and the postpartum period in a more controlled manner. Our study underscores the substantial reduction in cesarean section rates, especially among nulliparous pregnant women and those participating in training for three weeks or more. It is advisable to support antenatal training and exercise programs to reduce episiotomy and oxytocin augmentation rates, ultimately aiming to reach cesarean section rates that align with WHO recommendations.

Ethics Committee Approval:

This research complies with all the relevant national regulations, institutional policies and is in accordance with the tenets of the Helsinki Declaration, and has been approved by the Ankara Etlik City Hospital Ethical Committee (approval number: August, 2023/450).

Informed Consent:

All the participants' rights were protected and written informed consents were obtained before the procedures according to the Helsinki Declaration.

Author Contributions:

Concept – S.A.M., T.K.; Design - S.A.M., T.K.; Supervision – T.K., H.L. K.; Resources – S.A.M., T.K.; Materials – S.A.M., T.K., A.K.; Data Collection and/or Processing - A.K., İ.Ö.; Analysis and/ or Interpretation – T.K., S.A.M.; Literature Search – S.A.M., T.K., A.K.; Writing Manuscript – S.A.M., T.K.; Critical Review – H.L.K

Conflict of Interest:

The authors have no conflict of interest to declare.

Financial Disclosure:

The authors declared that this study has received no financial support.

Presented at Congress:

It was delivered as a summary oral presentation at TA-JEV Functional Medicine Congress (Istanbul) on 1-2 June 2023.

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