The Association between Synthetic Oxytocin Administration During Labor and Birth Interventions, Maternal Anxiety, and Newborn Stress Levels: A Comparative Study

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Abstract

Aim: The objective of this study was to examine the associations between synthetic oxytocin administration during labor, birth intervention rates, maternal anxiety levels, and newborn stress levels.

Method: This cross-sectional analytical study included 300 postpartum women divided into two groups: those who received synthetic oxytocin (n=197) and those who did not (n=103). Data were collected using the Personal Information Form, Labor Observation Form, State Anxiety Inventory (SAI), and Newborn Stress Scale (NSS). Multivariable regression analyses were performed to assess the independent associations while adjusting for potential obstetric and sociodemographic confounders.

Results: In unadjusted analyses, fundal pressure, placental retention, and episiotomy rates were higher in the synthetic oxytocin group ($p<0.05$). Women in this group also had higher SAI scores (51.43±3.39 vs. 50.11±3.54, $p=0.040$). and higher newborn stress levels ($p=0.002$). After adjusting for potential confounders in multivariable logistic regression, synthetic oxytocin administration remained significantly associated with increased odds of episiotomy (OR=2.04, 95% CI: 1.02–4.00, $p=0.042$) and placental retention (OR=7.14, 95% CI: 1.49–33.33, $p=0.014$). However, multivariable linear regression models for maternal anxiety ($p=0.077$) and newborn stress ($p=0.052$) did not reach overall statistical significance, indicating that these specific factors should not be interpreted as independently associated with oxytocin administration.

Conclusion: The findings suggest that synthetic oxytocin administration is associated with higher rates of specific obstetric interventions such as episiotomy and placental retention. Due to overall model limitations, the independent relationships regarding maternal anxiety and neonatal stress should be interpreted with caution. Healthcare professionals should prioritize individualized, evidence-based labor management to minimize unnecessary medical interventions.

Keywords: Synthetic oxytocin, labor induction, maternal anxiety, newborn stress, birth interventions, midwifery.

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Doğum Eylemi Sırasında Sentetik Oksitosin Uygulaması ile Doğum Müdahaleleri, Maternal Kaygı ve Yenidoğan Stres Düzeyleri Arasındaki İlişki: Karşılaştırmalı Bir Çalışma

Öz

Amaç: Bu çalışmanın amacı, doğum sürecinde uygulanan sentetik oksitosin kullanımı ile doğuma müdahale oranları, maternal kaygı düzeyi ve yenidoğan stres düzeyi arasındaki ilişkileri incelemektir.

Yöntem: Analitik kesitsel tasarıma sahip bu araştırmaya 300 postpartum kadın dahil edilmiş; katılımcılar sentetik oksitosin uygulananlar (n=197) ve uygulanmayanlar (n=103) olarak iki gruba ayrılmıştır. Veriler; Tanımlayıcı Bilgi Formu, Doğum Süreci Gözlem Formu, Durumluk Anksiyete Envanteri (STAI) ve Yenidoğan Stres Ölçeği (YSÖ) kullanılarak toplanmıştır. Olası karıştırıcı faktörler kontrol edilerek bağımsız ilişkileri değerlendirmek amacıyla çok değişkenli regresyon analizleri uygulanmıştır.

Bulgular: Düzeltilmemiş analizlerde, sentetik oksitosin uygulanan grupta fundal bası, plasental retansiyon ve epizyotomi oranları anlamlı düzeyde daha yüksek bulunmuştur ($p<0,05$). Bu gruptaki kadınların STAI skorları (51,43±3,39 vs. 50,11±3,54, $p=0,040$) ve yenidoğan stres düzeyleri ($p=0,002$) anlamlı derecede yüksek saptanmıştır. Çok değişkenli lojistik regresyon analizinde, olası karıştırıcı faktörler kontrol edildikten sonra sentetik oksitosin uygulamasının epizyotomi (OR=2,04, 95% CI: 1,02–4,00, $p=0,042$) ve plasental retansiyon (OR=7,14, 95% CI: 1,49–33,33, $p=0,014$) ile anlamlı ilişkisi devam etmiştir. Ancak, maternal kaygı ($p=0,077$) ve yenidoğan stresi ($p=0,052$) için kurulan çok değişkenli doğrusal regresyon modelleri genel olarak istatistiksel anlamlılığa ulaşamamıştır; bu durum ilgili değişkenlerin oksitosin uygulamasıyla bağımsız bir ilişki göstermediğine işaret etmektedir.

Sonuç: Çalışma bulguları, sentetik oksitosin uygulamasının epizyotomi ve plasental retansiyon gibi belirli doğuma müdahale oranlarındaki artış ile ilişkili olabileceğini göstermektedir. Ancak genel model sınırlılıkları nedeniyle, sentetik oksitosinin maternal kaygı ve yenidoğan stresi üzerindeki bağımsız ilişkilerine dair bulgular ihtiyatla yorumlanmalıdır. Doğum yönetiminde gereksiz tıbbi müdahalelerden kaçınılması ve bireyselleştirilmiş, kanıta dayalı yaklaşımların benimsenmesi önerilmektedir.

Anahtar Sözcükler: Sentetik oksitosin, doğum indüksiyonu, maternal anksiyete, neonatal stres, doğum müdahaleleri, ebelik.

Introduction

Labor is a physiological process that can occur spontaneously, or it can occur in cases where intervention is required. One of these interventions is the application of induction in labor[1,2]. Induction in labor is the rupture of the amniotic membrane by stimulating it with mechanical or pharmacological agents in cases where labor does not start spontaneously[3,4]. Clinically, induction can be applied in cases where cervical ripening is appropriate, signs of labor onset are seen, and there are no contraindications for the mother or baby. In this context, one of the most commonly used agents for initiating labor is synthetic oxytocin[5,6].

While the rate of labor induction application varies between 20% and 30% globally, it is observed that this rate is quite high in Türkiye. Oxytocin application rates have been reported as 60-96%, amniotomy rates as 67-78%, and vaginal prostaglandin application rates as 12.6%[7]. In births in which synthetic oxytocin is administered, higher complication rates are encountered compared to spontaneous births. Hyperstimulation, cesarean section, hypotension, antidiuretic effect, neonatal hyperbilirubinemia, uterine

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rupture, and fetal distress are among these complications[8]. These complications not only pose physiological risks but also increase anxiety about the labor process in pregnant women.

The labor process is not only a physiological but also a psychological experience for women. A large portion of women are afraid of birth and may experience intense anxiety due to a lack of sufficient information about the nature of birth or due to negative environmental effects[9,10]. Factors such as the thought that the baby may be harmed during birth, physical pain, loss of control, and a sense of uncertainty increase the level of anxiety in women[11,12]. This psychological state can negatively affect the course of labor; it can lead to a prolongation of labor, increased pain, and even an increase in the need for intervention. Increased maternal anxiety can cause complications such as fetal stress, bleeding, rapid or prolonged labor[10] .

Studies show that state anxiety levels are higher in women who undergo synthetic oxytocin induction during labor compared to those who give birth spontaneously[1]. These findings reveal that not only the physiological but also the psychological effects of oxytocin administration should be carefully evaluated.

In our health system, midwives usually apply synthetic oxytocin during labor under a physician's order. It is known that synthetic oxytocin application is quite common in Türkiye[9]. However, before induction, midwives should evaluate the Bishop score, inform the pregnant woman, obtain consent, and provide psychological relief. It is recommended that the fetal heart rate be regularly monitored during the application, the dose be reduced or stopped in case of abnormalities, the pregnant woman be placed in the left lateral position, oxygen be administered, and intravenous fluid support be provided[7,9,13].

Induction is an important issue as it affects maternal-fetal mortality and morbidity rates. However, it is known and observed that induction is widely used in our country[9]. On the other hand, when the literature on this subject is examined, limited studies were found, especially limited studies were conducted in the national literature. In these studies, the effect of the labor process on the situation of cesarean delivery, mother-baby bonding, and postpartum anxiety levels were examined[7].

In this context, the objective of this study was to examine the associations between synthetic oxytocin administration during labor and birth intervention rates, maternal anxiety levels, and newborn stress levels. By comparing women who received synthetic oxytocin with women who experienced natural labor, it was aimed to examine both the physiological and psychological consequences of this medical intervention in a multifaceted manner and to present evidence-based data on the labor process with the findings obtained.

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Material and Methods

Research Design

This study was conducted as a single-center, cross-sectional observational study in a public hospital in southern Türkiye between February and June 2025. The study investigated the associations between synthetic oxytocin administration during labor and birth intervention rates, maternal anxiety, and newborn stress levels. Two groups of laborers who received and did not receive synthetic oxytocin were compared.

Population and Sample of the Research

The population of the study was formed in the postpartum ward of Kahramanmaraş Necip Fazıl City Hospital, Maternity and Children's Hospital. The sample size was recalculated using G*Power version 3.1.9.7 for the comparison of two independent group means[14]. Based on a two-tailed independent-samples t-test, a moderate effect size (Cohen's d=0.43), a type I error rate of 5% (α=0.05), and 95% statistical power (1−β=0.95), the minimum required total sample size was calculated as approximately 288 participants. To account for possible missing or incomplete data, the target sample size was increased, and the study was completed with 300 postpartum women. In the study hospital, the decision to administer synthetic oxytocin was made by the attending obstetrician based on clinical indications such as slow labor progression or inadequate uterine contractions. Following the physician's decision, synthetic oxytocin was administered according to the hospital's standard low-dose oxytocin protocol. The oxytocin solution was prepared as 10 U diluted in 1000 mL of saline. The infusion was initiated at 12 mL/hour and increased by 12 mL/hour every 15 minutes until adequate uterine contractions (3–4 contractions lasting at least 40 seconds within 10 minutes) were achieved. The maximum infusion rate was limited to 48 mL/hour, corresponding to approximately 10 mIU/min. The researchers did not interfere with clinical decision-making and only observed routine clinical practices.

Inclusion Criteria:

- ✓ Being between 18 and 40 years old,
- ✓ Having had a singleton pregnancy,
- ✓ Having given birth at term (37–42 weeks of gestation),
- ✓ Having had a live birth without fetal anomalies,
- ✓ Those in the synthetic oxytocin group were only given synthetic oxytocin during labor,
- ✓ Those who received synthetic oxytocin induction (Synthetic oxytocin group),
- ✓ Those who did not receive synthetic oxytocin induction (Natural oxytocin group).

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Exclusion Criteria:

- ✓ Those with a history of medical or obstetric complications (placenta previa, preeclampsia, premature rupture of membranes, oligohydramnios, malpresentation, intrauterine growth retardation, intrauterine dead fetus, macrosomic babies, etc.),
- ✓ Those with a history of psychiatric diagnosis.

Data Collection Tools

Personal Information Form: The Personal Information Form, which was created as a result of the researcher's literature review, consists of questions that determine some characteristics of women (such as age, education, employment) and obstetric history (such as gestational week, number of pregnancies, number of births[7,15,16].

Labor Observation Form: This form was prepared based on literature to determine the characteristics of the process by observing the stages of labor by the researcher[17]. The form includes a total of 15 questions about the first, second, and third stages of labor.

State Anxiety Inventory (SAI): Developed by Spielberger et al. (1970), it was adapted into Turkish by Öner and Le Compte[18](1983). The State Anxiety Inventory is about describing how a person feels at a certain moment and under certain conditions and the intensity of their feelings at that moment when reading the items of the inventory. The inventory consists of 20 items, and 10 items are reverse scored (items 1, 2, 5, 8, 10, 11, 15, 16, 19, and 20). The lowest total score to be obtained from the inventory is 20, and the highest is 80. As the total score increases, it shows that the anxiety level increases. The reliability coefficients determined by alpha correlations in the adaptation of the State Anxiety Inventory to Turkish were found to be between 0.83 and 0.92[18].

Newborn Stress Scale: The newborn stress scale developed by Ceylan and Bolışık consists of a total of 24 items on a 3-point Likert scale. The scale items include 8 subgroups, including facial expression, body color, respiration, activity level, comfortability, muscle tone, extremities, and posture, and each subgroup is evaluated between 0 and 2 points in the scoring. The minimum score is 0, and the maximum score is 16 points. As the score increases, the baby's stress level increases simultaneously[19].

Data Collection Process

Data were collected through face-to-face interviews starting with admission to the delivery room, during labor pains and delivery, and within the first 24 hours following delivery[16]. The State Anxiety Inventory was administered to mothers within the first 6 hours after delivery. The 1-minute and 5-minute APGAR scores were assessed immediately after birth by the neonatal clinical team and obtained directly from the original delivery records. The scores were recorded using the standard 0–10 APGAR scoring system, and no mathematical conversion or rescaling was performed. Newborn stress symptoms were assessed based on clinical observation within the first 30 minutes

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after delivery. Throughout the data collection process, all observations and scale applications were carried out by the same trained health professional. This approach was preferred to increase measurement reliability.

Ethical Statement

In order to conduct the study, ethical approval was obtained from Inonu University's Non-Interventional Research Ethics Committee (Decision number: 2025/7112; date: 04.02.2025). In addition, before filling out the data collection forms, necessary explanations were given to the participants in order to protect their rights, and their consent was obtained with the "Informed Consent Form".

Statistical Analysis

The data obtained from the study were analyzed using SPSS 26.0 for Windows software (SPSS Inc., Chicago, IL, USA). Descriptive statistics of the participants are presented as mean ± standard deviation (Mean±SD), number (n), and percentage (%).

In comparing demographic and labor characteristics between groups, appropriate tests were used according to the type and distribution of the variables. The Kolmogorov-Smirnov test was used to evaluate the suitability of continuous variables for normal distribution; the independent samples t-test was used for pairwise group comparisons of variables with normal distribution; and the Mann-Whitney U test was used for variables without normal distribution. Group comparisons for categorical variables were performed using the chi-square test (χ^2). Statistical significance was determined as $p<0.05$. In addition, multivariable logistic regression analyses were performed to examine the independent association between synthetic oxytocin administration and obstetric interventions. Multiple linear regression analyses were conducted to evaluate the associations between synthetic oxytocin administration and maternal anxiety and newborn stress levels. These models were adjusted for potential confounding variables, including maternal age, education level, income status, parity, pregnancy intention, gestational age, cervical dilatation, and oxygen requirement. Adjusted odds ratios (OR), standardized regression coefficients (β), and 95% confidence intervals (CI) were reported.

Results

The comparison of the sociodemographic characteristics of the participants according to their synthetic oxytocin intake is presented in Table 1. The mean age of the participants who gave birth with natural oxytocin was determined to be 27.35±5.80, and the mean age of those who received synthetic oxytocin was determined to be 27.24±6.07. It was determined that there was a statistically significant difference between the groups in terms of educational level and parity of the participants who gave birth naturally and with synthetic oxytocin ($p<0.05$). However, it was determined that there was no statistically significant difference between the groups in terms of age, employment, income level, and desired pregnancy variables ($p>0.05$; Table 1).

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Table 1. Comparison of the sociodemographic characteristics of participants according to oxytocin administration (n=300).

Characteristics	**Natural oxytocin (n=103)**		**Synthetic oxytocin (n=197)**		**Test and *p* values**
	n	**%**	**n**	**%**	
Age (years) (Mean±SD)	27.35±5.80		27.24±6.07		t=-0.159 p=0.874
Educational level					
Middle school or lower	61	59.2	56	28.4	χ^2=30.889 **p<0.001**
High school	36	35.0	96	48.7	
University or higher	6	5.8	45	22.8	
Employment					
Employed	19	18.4	30	15.2	χ^2=0.513 p=0.474
Unemployed	84	81.6	167	84.8	
Income level					
Good	10	9.7	15	7.6	χ^2=0.729 p=0.695
Moderate	71	68.9	133	67.5	
Low	22	21.4	49	24.9	
Having a desired pregnancy					
Present	91	88.3	162	82.2	χ^2=1.915 p=0.166
Absent	12	11.7	35	17.8	
Parity					
Multiparous	76	70.9	118	59.9	χ^2=5.709 **p=0.017**
Primiparous	27	29.1	79	40.1	

x^2: Chi-square test

Comparison of the participants' labor characteristics according to oxytocin administration is presented in Table 2. No significant difference was found between the groups receiving natural and synthetic oxytocin in terms of gestational age, cervical dilatation, amniotic fluid characteristics, oxygen requirement, and mode of delivery (p>0.05). On the other hand, statistically significant differences were found between the groups in terms of fundal pressure application, placental retention requirement, and episiotomy requirement (p<0.05). It was observed that these practices were used more frequently in participants receiving synthetic oxytocin (Table 2).

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Table 2. Comparison of the participants' labor characteristics according to oxytocin administration (n=300).

Characteristics	**Natural oxytocin (n=103)**		**Synthetic oxytocin (n=197)**		**Test and *p* values**
	n	**%**	**n**	**%**	
Gestational age (weeks) (Mean±SD)	39.36±1.55		39.69±1.49		t=-0.328 p=0.743
Cervical dilatation					
None	55	53.4	111	56.3	χ^2=0.400
1-4 cm	45	43.7	82	41.6	p=0.819
≥5 cm	3	2.9	4	2.0	
Amniotic fluid					
Clear	87	84.5	166	84.3	χ^2=0.002
Meconium	16	15.5	31	15.7	p=0.964
Oxygen requirement					
Present	20	19.4	35	17.8	χ^2=0.123
Absent	83	80.6	162	82.2	p=0.726
Application of fundal pressure					
Present	22	21.4	64	32.5	χ^2=4.096
Absent	81	78.6	133	67.5	**p=0.043**
Need for placental retention					
Present	2	1.9	17	8.6	χ^2=5.099
Absent	101	98.1	180	91.4	**p=0.024**
Episiotomy requirement					
Present	23	22.3	66	33.5	**χ^2=4.046**
Absent	80	77.7	131	66.5	**p=0.044**
Mode of delivery					
Vaginal	98	91.5	189	95.9	χ^2=0.103
Caesarean	5	4.9	8	4.1	p=0.749

x^2: Chi-square test

The comparison of maternal anxiety and newborn outcomes according to natural and synthetic oxytocin applications is presented in Table 3. According to maternal assessment, the SAI mean score of women who were administered synthetic oxytocin was found to be statistically significantly higher than women who were administered natural oxytocin (mean difference = 1.32, 95% CI: 0.48–2.16; Cohen's d = 0.38; p=0.040). This finding suggests that synthetic oxytocin administration was associated with higher maternal anxiety levels.

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According to neonatal assessment, the mean 1-minute APGAR score was significantly higher in the natural oxytocin group than in the synthetic oxytocin group (mean difference = −0.18, 95% CI: −0.28 to −0.08; Cohen's d = −0.47; p=0.001). However, the mean 5-minute APGAR scores increased to 8.42±1.52 and 8.52±1.20, respectively, and no statistically significant difference was observed between the groups (mean difference = −0.30, 95% CI: −0.64 to 0.04; Cohen's d = −0.23; p=0.087). In addition, the NSS mean score was significantly higher in the synthetic oxytocin group (mean difference = 0.28, 95% CI: 0.08–0.48; Cohen's d = 0.25; p=0.002). These findings indicate differences between the groups in immediate neonatal outcomes; however, no significant difference was observed in the 5-minute APGAR assessment (Table 3).

Table 3. Comparison of the maternal anxiety and newborn outcomes according to natural and synthetic oxytocin administration (n = 300).

Variables	Natural oxytocin (n=103)	Synthetic oxytocin (n=197)	Mean Difference (95% CI)		Cohen's d	Test*	*p* value
	mean±SD	mean±SD					
SAI	50.11±3.54	51.43±3.39	1.32	(0.48–2.16)	0.38	2.059	**p=0.040**
APGAR 1st min.	6.10±0.46	5.92±0.34	−0.18	(−0.28–−0.08)	-0.47	3.719	**p=0.001**
APGAR 5th min.	8.42±1.52	8.52±1.20	−0.30	(−0.64–0.04)	-0.23	1.850	p=0.087
NSS	0.04±0.21	0.32±1.37	0.28	(0.08–0.48)	0.25	-3.137	**p=0.002**

SD: Standard Deviation, *: Independent samples t-test, NSS variable was analyzed using the Mann–Whitney U test due to skewed distribution, SAI: State Anxiety Inventory NSS: Newborn Stress Scale, Mean difference calculated as synthetic oxytocin minus natural oxytocin. Cohen's d values interpreted as small (0.2), medium (0.5), and large (0.8) effect sizes.

Table 4. Multivariable logistic regression analysis of the association between synthetic oxytocin administration and obstetric outcomes.

Variable	Episiotomy OR (95% CI)	p	Fundal Pressure OR (95% CI)	p	Placental Retention OR (95% CI)	p
Oxytocin	2.04 (1.02–4.00)	0.042*	1.79 (0.88–3.70)	0.106	7.14 (1.49–33.33)	0.014*
Age	0.97 (0.91–1.03)	0.306	0.94 (0.88–1.01)	0.068	1.10 (0.99–1.22)	0.075
Education	0.65 (0.42–1.01)	0.056	0.77 (0.49–1.23)	0.272	0.71 (0.33–1.55)	0.394
Income	0.84 (0.53–1.34)	0.461	1.00 (0.61–1.63)	1.000	0.53 (0.23–1.24)	0.144
Parity	0.16 (0.09–0.30)	<0.001*	0.14 (0.08–0.26)	<0.001*	0.55 (0.17–1.77)	0.320

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Pregnancy planning	0.62 (0.21–1.83)	0.382	0.51 (0.15–1.79)	0.296	0.44 (0.08–2.31)	0.333
Gestational age	0.94 (0.77–1.16)	0.569	0.94 (0.76–1.16)	0.556	0.88 (0.62–1.23)	0.443
Oxygen requirement	1.68 (0.76–3.72)	0.204	1.15 (0.52–2.53)	0.733	1.16 (0.31–4.34)	0.829
Cervical dilatation	1.01 (0.76–1.35)	0.954	0.90 (0.66–1.23)	0.504	0.42 (0.16–1.12)	0.084

OR: Odds Ratio, CI: Confidence Interval, *p < 0.05 statistically significant

All models were adjusted for maternal age, education, income, parity, pregnancy intention, gestational age, cervical dilatation, and oxygen requirement

**Synthetic oxytocin administration was coded as 0 = no synthetic oxytocin administration and 1 = synthetic oxytocin administration. Therefore, OR > 1 indicates higher odds of the outcome among women receiving synthetic oxytocin.

The multivariable logistic regression analyses examining the association between synthetic oxytocin administration and obstetric outcomes are presented in Table 4. After adjusting for maternal age, educational level, income status, parity, pregnancy planning, gestational age, cervical dilatation, and oxygen requirement, a statistically significant association was found between synthetic oxytocin administration and episiotomy (OR=2.04, 95% CI: 1.02–4.00, p=0.042). Similarly, a significant association was observed between synthetic oxytocin administration and placental retention (OR = 7.14, 95% CI: 1.49–33.33, p = 0.014). However, no statistically significant association was found between synthetic oxytocin administration and fundal pressure application (p>0.05). In addition, parity was identified as a significant predictor for both episiotomy and fundal pressure (p<0.05). As parity increased, the likelihood of episiotomy decreased (OR=0.16, 95% CI: 0.09–0.30, p<0.001). No significant associations were observed between the other covariates and obstetric outcomes (p>0.05) (Table 4).

Table 5. Multivariable linear regression analysis of maternal anxiety and newborn stress.

Variable	**Maternal Anxiety (β)**	**95% CI**	**p**	**Newborn Stress (β)**	**95% CI**	**p**
Oxytocin administration	0.170	0.348 – 2.148	0.007	0.142	0.048 – 0.628	0.023
Age	-0.092	-0.127 – 0.019	0.145	0.108	-0.003 – 0.044	0.086
Education	0.025	-0.475 – 0.716	0.691	-0.062	-0.290 – 0.094	0.316
Income	-0.002	-0.671 – 0.645	0.969	0.041	-0.137 – 0.287	0.486

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Parity	-0.011	-1.004 – 0.839	0.860	0.074	-0.122 – 0.472	0.247
Gestational age	0.011	-0.259 – 0.311	0.859	-0.014	-0.102 – 0.081	0.824
Cervical dilatation	0.024	-0.309 – 0.460	0.699	-0.094	-0.219 – 0.029	0.134
Oxygen requirement	-0.069	-1.653 – 0.401	0.231	-0.020	-0.390 – 0.272	0.727
Model statistics	Maternal Anxiety Model R^2 = 0.047 Adjusted R^2 = 0.021 p = 0.077			Newborn Stress Model R^2 = 0.051 Adjusted R^2 = 0.025 p = 0.052		

β: Standardized regression coefficient, CI: Confidence interval, *p < 0.05 statistically significant

The multivariable linear regression analyses examining the associations between synthetic oxytocin administration and maternal anxiety and newborn stress levels are presented in Table 5. Although the regression coefficient for synthetic oxytocin administration was statistically significant in the maternal anxiety model (β = 0.170, p = 0.007), the overall regression model was not statistically significant (model p = 0.077). Similarly, although the regression coefficient for synthetic oxytocin administration reached statistical significance in the newborn stress model (β=0.142, p=0.023), the overall model did not reach statistical significance (model p=0.052). No statistically significant associations were observed for the remaining covariates (p>0.05). Therefore, these findings should be interpreted with caution and should not be considered evidence of independent associations between synthetic oxytocin administration and maternal anxiety or newborn stress levels (Table 5).

Discussion

This study found that synthetic oxytocin administration during labor was associated with differences in maternal and newborn outcomes. The findings presented that maternal anxiety levels were significantly higher in the group receiving synthetic oxytocin, interventions during labor (fundal compression, episiotomy, placental retention, etc.) occurred more frequently, and newborn stress levels were higher. These results emphasize that not only the physiological but also the psychological consequences of synthetic oxytocin administration should be considered.

When evaluated from a sociodemographic perspective, educational level and parity variables significantly affect synthetic oxytocin administration. The higher rate of synthetic oxytocin administration among women with higher education levels may be related to differences in communication with healthcare professionals or variations in clinical decision-making processes. However, this interpretation should be considered cautiously, as the observational design does not allow causal inference. This situation has

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also been emphasized in the literature by Sharan et al.[20]. However, the fact that variables such as age, employment, income level, and having a desired pregnancy are not significantly related to synthetic oxytocin application suggests that clinical decision processes are more effective in the application of this intervention.

It is frequently emphasized in the literature that labor is a physiological process and that this process should be allowed to proceed as naturally as possible[21]. However, in some cases, medical interventions may be unavoidable. Synthetic oxytocin induction is a method frequently used to initiate and advance labor. However, the findings obtained in our study revealed that this intervention may be accompanied by chain interventions in the labor process and may be associated with higher frequencies of obstetric interventions. Indeed, in our study, fundal pressure, episiotomy, and placental retention rates were found to be significantly higher in the synthetic oxytocin group[22–24].

When evaluated in terms of maternal psychological outcomes, postpartum anxiety scores were significantly higher in women who received synthetic oxytocin. However, the multivariable linear regression model was not statistically significant overall; therefore, these findings should be interpreted cautiously and should not be considered evidence of an independent association between synthetic oxytocin administration and maternal anxiety. Factors such as continuous fetal monitoring, restriction of freedom of movement, and decreased sense of control over the birth process can increase women's anxiety levels[1,21]. Similarly, in previous studies, it was stated that oxytocin administration increased labor pain, contraction intensity, and postpartum fear levels[16]. These findings suggest that postpartum anxiety levels may be associated with the overall childbirth experience and obstetric interventions rather than synthetic oxytocin alone.

When evaluated in terms of newborn outcomes, the mean 1-minute APGAR score was significantly higher in the natural oxytocin group than in the synthetic oxytocin group. The 1-minute and 5-minute APGAR scores were rechecked against the original delivery records by the neonatal clinical team. This re-evaluation confirmed that the recorded APGAR scores accurately reflected the original delivery records and had been documented using the standard 0–10 APGAR scoring system, without any mathematical conversion or rescaling. Although the mean 1-minute APGAR scores were relatively low in both groups, the mean 5-minute APGAR scores increased to above 8, indicating rapid early neonatal adaptation. Therefore, a relatively low 1-minute APGAR score alone should not be interpreted as evidence of neonatal asphyxia, particularly in the absence of additional clinical indicators such as cord blood gas analysis or neonatal resuscitation data. In addition, the Neonatal Stress Scale score was significantly higher in the synthetic oxytocin group. These findings should be interpreted cautiously because detailed neonatal clinical parameters, such as cord blood gas analysis and neonatal resuscitation data, were not available in the present study. These findings are also supported by Thangarajah et al. (2016)[25], who reported that babies who underwent induction required more medical intervention. On the other hand, some studies, such as Budak et al. (2016)[5] and Budden et al. (2014)[26], reported that synthetic oxytocin had no significant effect on APGAR scores. These contradictory findings indicated that further studies are needed on

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the effects of synthetic oxytocin administration on newborn health. Similarly, although newborn stress scores differed significantly between the groups in the unadjusted analyses, the adjusted multivariable regression model was not statistically significant overall. Therefore, these findings should be interpreted cautiously and should not be considered evidence of an independent association between synthetic oxytocin administration and newborn stress levels.

In general, these findings indicated that it is important for both maternal and newborn health to allow birth to occur under physiological conditions as much as possible. Medical interventions should be limited unless necessary, and the natural course of birth should be supported. Careful evaluation of synthetic oxytocin applications in clinical decision processes is crucial in terms of preventing the chain of interventions and possible complications related to labor. These findings suggest a possible association between synthetic oxytocin administration and maternal and neonatal outcomes; however, this relationship may be influenced by underlying clinical and obstetric factors. In addition, detailed clinical parameters such as Bishop score, membrane status, and active or latent labor phase were not systematically recorded in this study. However, cervical dilatation and amniotic fluid characteristics were included in the analysis to partially account for clinical labor conditions. Therefore, the observed differences between groups may partly reflect underlying clinical indications rather than the direct effects of synthetic oxytocin.

Strengths of the Study

This study has several strengths. First, it evaluates synthetic oxytocin administration together with both maternal and neonatal outcomes, providing a comprehensive and interdisciplinary perspective. Second, the study was conducted in a real clinical setting, reflecting routine obstetric practice and increasing the external validity of the findings. Third, the sample size was adequate and supported by power analysis, which strengthens the reliability of the results.

Limitation

These findings should be interpreted considering several limitations. First, the State Anxiety Inventory was administered within the first 6 hours postpartum; therefore, anxiety scores may reflect not only synthetic oxytocin exposure but also labor difficulty, obstetric interventions, pain, fatigue, and early postpartum physiological and emotional conditions. Second, newborn stress was assessed through clinical observation within the first 30 minutes after birth by the same healthcare professional. As the evaluator was not blinded to group allocation, observer bias cannot be ruled out. Third, although multivariable analyses were conducted, the observational design of the study limits causal interpretation. In addition, detailed clinical parameters such as Bishop score, membrane status, and active or latent labor phase were not systematically recorded. Therefore, the observed differences may partly reflect underlying clinical conditions rather than the direct effects of synthetic oxytocin.

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Conclusion

This study found that synthetic oxytocin administration during labor was associated with higher frequencies of obstetric interventions. In line with these findings, it is recommended that healthcare professionals, especially midwives, be more careful in their decisions regarding oxytocin administration and adopt an individualized approach. Avoiding unnecessary interventions and adopting an individualized, evidence-based approach may contribute to a more positive birth experience and potentially better maternal and neonatal outcomes. This study emphasized once again that synthetic oxytocin applications are not limited to physiological outcomes; moreover, birth should be considered as a holistic experience.

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REFERENCES

1. Göçen NN, Amanak K. Efectele inducţiei travaliului asupra legăturii postpartum mamă-copil şi a nivelului de anxietate [The effects of labor induction on postpartum mother-infant bonding and anxiety levels]. *JBM*. 2022:17–25. doi: 10.31926/jmb.2022.1.1.

2. Romano AM, Lothian JA. Promoting, protecting, and supporting normal birth: a look at the evidence. *Journal of Obstetric, Gynecologic & Neonatal Nursing*. 2008;37(1):94–105.

3. Erickson EN, Bailey JM, Colo SD, Carlson NS, Tilden EL. Induction of labor or expectant management? Birth outcomes for nulliparous individuals choosing midwifery care. *Birth*. 2021;48(4):501–513. doi: 10.1111/birt.12560.

4. Mc Carthy FP, Kenny LC. Induction of labour. *Obstetrics, Gynaecology & Reproductive Medicine*. 2014;24(1):9–15. doi: 10.1016/j.ogrm.2013.11.004.

5. Budak MŞ, Kaya C, Akgöl S, et al. Labor Induction with prostaglandin e2-experience of a maternity and children's disease hospital. *The Journal of Gynecology - Obstetrics and Neonatology*. 2013;13(2):61–64.

6. Demirel G, Çelik Bilgiç D. Doğal doğuma müdahale: sentetik oksitosin kullanımı. düzeylerinin incelenmesi. *STED / Sürekli Tıp Eğitimi Dergisi*. 2013;22(4):157–162.

7. Bal Şaraldi H, Ekin P, Karaçam Z. Doğumda indüksiyon uygulanma durumunun acil sezaryen doğuma etkisi. *Karya Journal of Health Science*. 2023;4(3):192–198.

8. Clark SL, Miller DD, Belfort MA, Dildy GA, Frye DK, Meyers JA. Neonatal and maternal outcomes associated with elective term delivery. *American Journal of Obstetrics and Gynecology*. 2009;200(2):156.e1-156.e4. doi: 10.1016/j.ajog.2008.08.068.

9. Bay F, Özbolat Ü. Doğum indüksiyonu: maternal, fetal-neonatal etkileri, ebenin rolü. *KTO Karatay Üniversitesi Sağlık Bilimleri Dergisi*. 2020;1(1):4–14.

10. Üst ZD, Pasinlioğlu T, Özkan H. Doğum eyleminde gebelerin anksiyete. *Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi*. 2013;16(2):110–116.

11. Çalışkan E. Doğuma Hazırlık Eğitiminin Perinatal Anksiyete Düzeyi, Doğum Korkusu ve Bağlanmaya Etkisi. [yüksek lisans tezi], İstanbul Medipol Üniversitesi Sağlık Bilimleri Enstitüsü, İstanbul, 2019.

12. Bayrampour H, Ali E, McNeil DA, Benzies K, MacQueen G, Tough S. Pregnancy-related anxiety: a concept analysis. *International Journal of Nursing Studies*. 2016;55:115–130.

13. Simpson KR, James DC. Efficacy of intrauterine resuscitation techniques in improving fetal oxygen status during labor. *Obstetrics & Gynecology*. 2005:105(6):1362–1368.

14. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*. 2007;39(2):175–191. doi: 10.3758/BF03193146.

15. Öztürk Dönmez R, Fidan G. The use of the intervention wheel in pregnancy monitoring during the pandemic. *Ege University Faculty of Nursing Journal*. 2024;40(2):321–327.

16. İsbir GG, Topçu B. The effects of intrapartum oxytocin induction on labor pain and fear of labor. *Hemşireik Eğitim ve Araştırma Dergisi*. 2018;15(2):94–98.

17. Başgöl Ş, Beji Kızılkaya N. Kontinans hemşirelerinin gelişen rollerinin uluslararası düzeyde irdelenmesi. *Florence Nightingale Hemşirelik Dergisi*. 2015;23(3):224–230.

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18. Öner N, Le Compte W. *Intermittent State/Continuous Anxiety Inventory Handbook*. Istanbul: *Boğaziçi University Press;* 1985.

19. Ceylan SS, Bolışık B. Yenidoğan stres ölçeği'nin psikometrik özelliklerinin incelenmesi. *Acıbadem Üniversitesi Sağlık Bilimleri Dergisi*. 2017;2:97–103.

20. Sharan M, Strobino D, Ahmed S. Intrapartum oxytocin use for labor acceleration in rural India. *International Journal of Gynecology & Obstetrics*. 2005;90(3):251–257.

21. Buckley S, Uvnäs-Moberg K, Pajalic Z, et al. Maternal and newborn plasma oxytocin levels in response to maternal synthetic oxytocin administration during labour, birth and postpartum – a systematic review with implications for the function of the oxytocinergic system. *BMC Pregnancy Childbirth*. 2023;23(1):137.

22. Şentürk Erenel A, Çiçek S. Doğum şeklinin anne ve yenidoğan sağlığına etkisi. *Süleyman Demirel Üniversitesi Sağlık Bilimleri Dergisi*. 2018;9(2):123–129.

23. Girgin Ş, Tezcan H, Hamlacı Başkaya Y. The effect of medicalisation in childbirth on childbirth satisfaction and postpartum comfort level. *KTO Karatay Üniversitesi Sağlık Bilimleri Dergisi*. 2024;5(2):108–120. doi: 10.59244/ktokusbd.1453673.

24. Şahin M, Erbil N. Birth and medicalization. *Ordu University J Nurs Stud*. 2019;2(2):120-130.

25. Thangarajah F, Scheufen P, Kirn V, Mallmann P. Induction of labour in late and postterm pregnancies and its impact on maternal and neonatal outcome. *Geburtshilfe Frauenheilkd*. 2016;76(07):793–798. doi: 10.1055/s-0042-107672.

26. Budden A, Chen LJ, Henry A. High-dose versus low-dose oxytocin infusion regimens for induction of labour at term. *Cochrane Database of Systematic Reviews*. 2014;10:CD009701. doi: 10.1002/14651858.CD009701.pub2/full

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