Research Article/ Araştırma Makalesi

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# Analysis of birth statistics, examination of caesarean rates and caesarean indications; Retrospective study

## Doğum istatistiklerinin analizi, sezaryen oranları ve sezaryen endikasyonlarının incelenmesi; Retrospektif çalışma

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**ABSTRACT**

**Aim:** This study investigated cesarean delivery rates and indications for cesarean delivery among patients who gave birth in our clinic between 2019 and 2022.

**Material and Method:** For the study, the data of 16,559 patients who gave birth between 2019 and 2022 in the Obstetrics and Gynecology clinic of a Training and Research Hospital were retrospectively analyzed. The mode of delivery, gender information, fetal birth weight, vaginal delivery, and cesarean section rates and indications for cesarean section were analyzed.

**Results:** Among the patients who gave birth in our clinic between January 01, 2019, and December 31, 2022, 58.1% delivered vaginally, and 41.9% delivered by cesarean section. According to the four-year average, 48.5% of the babies born were girls, and 51.5% were boys. The most common indication for cesarean section was previous uterine surgery. The rate of primary cesarean section among cesarean deliveries was 47%. The most common indications for primary cesarean section were fetal distress, breech presentation, and non-progressive labor.

**Conclusion:** In our clinic, the four-year average cesarean delivery rate was 41.9%. Although this rate is below the national average of 53%, it is above the Ministry of Health's target rate of 35% in Turkey. When evaluated specifically for our province, we think this is mainly due to the lack of obstetrician-gynecologists in the districts and the high number of referrals to our hospital. Nevertheless, considering these results, it is clear that more comprehensive studies are needed to reduce cesarean section rates.

Keywords: Caesarean Section Rates, Vaginal Birth, Caesarean Section Indications

**ÖZ**

**Amaç:** Bu çalışma, kliniğimizde 2019 ile 2022 yılları arasında doğum yapan hastalar arasında sezaryen doğum yapanların oranlarını ve sezaryen doğum endikasyonlarını araştırma amacıyla yapıldı.

**Gereç ve Yöntem:** Çalışma için, bir Eğitim ve Araştırma Hastanesi Kadın Hastalıkları ve Doğum kliniğinde, 2019 ile 2022 yılları arasında doğum yapan 16.559 hastanın verileri retrospektif olarak incelendi. Bu tarihler arasındaki doğumu gerçekleştirilen bebeklerin doğum şekli, cinsiyet bilgileri, fetal doğum ağırlığı, vajinal doğum ve sezaryen doğum oranları ve sezaryen endikasyonları incelendi.

**Bulgular:** Kliniğimizde 01 Ocak 2019 ile 31 Aralık 2022 tarihleri arasında doğum yapan hastaların %58,1'i vajinal doğum yaparken %41,9'u sezaryen yöntemi ile doğum yaptı. Dört yıllık ortalamaya göre doğan bebeklerin %48,5'i kız, %51,5'i erkek bebek olarak doğdu. En sık karşılaşılan sezaryen endikasyonu geçirilmiş uterin cerrahi oldu. Sezaryen doğumlar arasında primer sezaryen oranı %47 olarak saptandı. Primer sezaryen doğumlar arasında en sık karşılaşılan endikasyonlar fetal distress, makat prezentasyon ve ilerlemeyen eylem olarak saptandı.

**Sonuç:** Kliniğimizde, dört yıllık ortalama sezaryen doğum oranı %41,9 olarak gerçekleşti. Bu oran her ne kadar %53 olan Türkiye ortalamasının altında kalsa da Sağlık Bakanlığının Türkiye genelinde amaçladığı oran olan %35'in üzerindedir. İlimiz özelinde değerlendirildiğinde bunun başlıca nedeni ilçelerde kadın doğum uzman hekim yetersizliği ve hastanemizin çok sevk almasından kaynaklandığını düşünmekteyiz. Yine de bu sonuçlar göz önüne alındığında sezaryen doğum oranlarını azaltmak için daha kapsamlı çalışmalar yapmak gerektiği açıktır.

Anahtar Kelimeler: Sezaryen Doğum Oranları, Normal Doğum, Sezaryen Endikasyonları

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## INTRODUCTION

Cesarean section is a very common obstetric surgical procedure in obstetric practice worldwide (1). Cesarean delivery can be defined as the abdominal delivery of the fetus in women scheduled for vaginal delivery when fetal or maternal risks arise (1,2). While cesarean delivery is a maternal and fetal life-saving surgical procedure when performed with the necessary indications, it is increasingly being performed electively on physician or maternal request and has almost replaced normal vaginal delivery.

However, it should be noted that cesarean section performed outside of medical indications causes maternal and fetal complications and also damages national economies by causing increased health expenditures. Studies have shown that compared to normal vaginal delivery, the maternal mortality rate is 11 times higher in cesarean sections (3). Compared with normal vaginal delivery, the main causes of maternal mortality in cesarean deliveries include cardiac arrest, anesthesia complications, puerperal infection, postpartum hysterectomy, surgical wound infections and venous thromboembolism (4,5). Today, easy access to blood transfusion products, the widespread use of antibiotics and the significant development of surgical methods lead to a decrease in postoperative complication rates, which in turn leads to an increase in cesarean section rates.

Although the World Health Organization (WHO) declares the ideal cesarean section rate as 10-15% of all births, it is very difficult for countries to achieve this rate. Especially in our country, cesarean section rates are increasing day by day. In 2011, the Turkish Gynecology and Obstetrics Association (TJOD) and the Ministry of Health launched a joint effort to reduce the cesarean section rates in our country to below 35%. Still, in some subsequent years, these rates have risen to 52% and even among the Organization for Economic Cooperation and Development (OECD) countries, cesarean section rates are among the highest (6).

When we examine the reasons for the increase in cesarean delivery rates, we encounter many reasons such as women's concerns about their postpartum sexual function, widespread use of ultrasonography and fetal monitoring, increasing rates of multiple pregnancies, increasing rates of advanced age pregnancies, widespread use of assisted reproductive techniques, increasing number of women who had their previous birth by cesarean section, desire for tubal ligation, increasing lawsuits against physicians and lack of adequate legal infrastructure to combat this (7,8).

In this study, we examined birth data in our province and aimed to evaluate maternal and fetal outcomes, especially cesarean delivery rates.

## MATERIAL AND METHOD

We conducted the study in the province of Ağrı, located in the eastern Anatolia region of Turkey. Turkish Statistical Institute (TÜİK) data show that Ağrı ranks fifth among all provinces according to fertility rate. For the study, the data of patients who gave birth in the Gynecology and Obstetrics Clinic of a Training and Research Hospital between January 1, 2019 and December 31, 2022 were retrospectively analyzed. The number of patients who gave birth in our clinic between these dates and whose complete data were accessed was 16559. Patients with incomplete data were not included in the study.

Ethical approval was obtained from Ağrı İbrahim Çeçen Univercity Scientific Research Ethics Committee as of 08.11.2022 with the number 235.

### Statistical Analysis

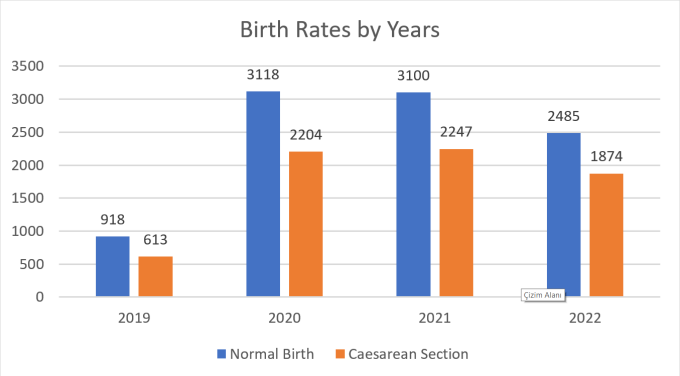
SPSS 28.0 program was used for data analysis. Number and percentage values were used for categorical measurements and mean and standard deviation values were used for descriptive statistics. Shapiro Wilk test was used to determine whether the variables met the normal assumption. Chi-Square test was used to compare categorical and continuous variables. One-way ANOVA test was used to measure the effect of more than one continuous independent variable on the dependent variable and factorial ANOVA test was used to compare two or more independent variables. The results were considered statistically significant at the $p< 0.05$ level.

## RESULTS

Our study examined the archival data of 16559 patients who gave birth in the Gynecology and Obstetrics Clinic of Ağrı Training and Research Hospital. In our study, we reviewed the files of 16559 patients who met the criteria and whose complete data were available. Between the dates of the study, 9621 patients delivered vaginally, and 6938 patients delivered by cesarean section. While 99.3% of the patients gave live birth, stillbirth occurred in 0.7%. The mean gestational age at delivery was 38.03 weeks.

When we examine the birth data, it is seen that the rates of normal and cesarean delivery did not change statistically significantly by years (Figure 1). Looking at the number of births by years, it is seen that the total number of births in 2019 was lower than in other years. This is because the number of patients included in the study was low due to the lack of data on patients who gave birth in 2019 (Figure 1). When we look at the averages of all years, the number of normal deliveries was 9621 (58.1%) and the number of cesarean sections was 6938 (41.9%). When we look at the distribution of cesarean section rates by years, we see that it was 613 (40.0%) in 2019, 2204 (41.4%) in 2020, 2247 (42.0%) in 2021, and 1874 (43.0%) in 2022. Caesarean section rates have increased steadily over the years, but this is not statistically significant ($p=0.182$, $p>0.05$) (Figure 1).

**Figure 1. Vaginal and Cesarean Birth Rates by Years**




*Chi-Square Test, $p=0.182$, $p>0.05$

When we grouped the women who gave birth according to their ages, there was no statistically significant difference between the years ($p=0.069$, $p>0.05$) (Table 1). In all years, most women who gave birth were between 20 and 31 (Table 1). When we analyzed the live birth and stillbirth rates, there was no statistically significant difference between the years ($p=0.916$, $p>0.05$). While the four-year average live birth rate was 99.3%, the stillbirth rate was 0.07% (Table 1). When we analyzed the gender of newborns according to years, no statistically significant difference was found between years in terms of newborn gender ($p=0.673$, $p>0.05$). Looking at the average of all years, 48.5% of newborns

were female and 51.5% were male (Table 1). When women were analyzed according to gravidity (p=0.013, p<0.05) and parity (p=0.047, p<0.05) rates, a statistically significant difference was found between the years (Table 1). However, when we analyzed the number of abortions and gestational weeks according to the years, there was no statistically significant difference between the years (Table 1).

When we examine the indications for cesarean section according to years, it is seen that there is no statistically significant difference between years in terms of indications for cesarean section. 'Previous cesarean section' was the indication for cesarean section with the highest rate in all years. When we examined the indications for primary cesarean section, it was observed that cesarean section was performed due to 'Fetal Distress' at the highest rate in all years, followed by presentation anomalies and non-progressive labor indications (Table 2). The distribution of all other indications for cesarean section and their rates between the years is shown in Table 2 (Table 2).

Neonates were evaluated in terms of the relationship between their sex and birth weight over the years. No statistically significant difference was found between neonatal sex and birth weight over the years (p=0.752, p>0.05) (Table 3). The mean birth weight of female babies had been 3010.03 g, while the mean birth weight of male babies had been 3103.98 g.

## DISCUSSION

Cesarean section, which is defined as abdominal delivery of the fetus in cases where vaginal delivery cannot be performed due to maternal or fetal risks, is being performed at increasing rates both in the world and in our country.

WHO has defined acceptable primary cesarean section rates as 15% and reported that cesarean sections performed off-label do not improve maternal and neonatal mortality rates (9). In our country, studies are being carried out by the Ministry of Health to reduce primary cesarean section rates. Within the scope of these studies, acceptable primary cesarean section rates in Training and Research Hospitals were determined as 20%, but as a result of the studies, it was seen that the cesarean section rates in our country were not at the planned level at all. According to the 2018 data of the Turkiye Population and Health Survey, the total cesarean section rate in our country was found to be 52% (10).

In our study, we evaluated the 4-year birth statistics in Ağrı province, which is one of the provinces in the Eastern Anatolia region and ranks fifth according to the fertility rate according to 2022 data. In our study, we found that the average cesarean section rate for four years was 41.9%. In addition, the average primary cesarean section rate for these years was 47% and the most common indication for cesarean section was 'previous uterine surgery' with an average rate of 53%. Both results are far from the rates determined by the Ministry of Health. When evaluated in our province, we think that the main reason for this is the referral of both secondary and primary cesarean section patients to our hospital due to the insufficient number of specialist physicians in our province.

In both domestic and international literature reviews, the most common indication for cesarean section was previous uterine surgery (11-13). The main reason for this is that the 'once a cesarean, always a cesarean' mentality is still widely accepted among obstetricians and gynecologists. When the results of our study are evaluated, similar to the literature, we see that the most common indication for cesarean section was previous uterine surgery (53%).

In many studies, fetal distress is the first or second most common reason for primary cesarean section. In his study, Uçkan (14), retrospectively analyzed the data of 59,539 patients who gave birth in Van province in four years and found that fetal distress was the second most common cause of primary cesarean section among the indications for cesarean section. Similarly, Aksoy et al. (12) analyzed the data of 6765 patients in labor and found that fetal distress was the most common indication for primary cesarean section with a rate of 16%. Again, Kiremitli et al. (15) compared the indications for emergency and elective cesarean section in 459 patients and found fetal distress to be the most common indication for primary cesarean section. In our study, fetal distress was the most common indication for primary cesarean section and the 4-year mean rate was 17.4%. We think that the reason for the high number of cesarean sections due to fetal distress is the current widespread use of fetal electronic monitoring and early and frequent diagnosis of fetal distress due to uteroplacental insufficiency. In addition, studies have reported that continuous fetal electronic monitoring of patients in active labor leads to increased rates of false fetal distress and therefore increased cesarean deliveries due to fetal distress (16).

In his study, Uçkan (14), found that the most common cause of primary cesarean section was head and pelvis incompatibility. However, Aksoy et al. (12) found that among primary cesarean section patients, cesarean section due to head and pelvic incompatibility ranked second with 11%. Küçükbaş et al. (17) also found head and pelvic incompatibility as the second most common indication with a rate of 16.5% in their study. When we evaluate the results of our study, we see that the most important difference from the literature is that the rate of cesarean delivery with the indication of head and pelvic incompatibility is quite low. In our study, the 4-year mean cesarean delivery rate due to head and pelvis incompatibility was 0.9%. This differs significantly from the literature. We think that the main reason for this is that the prenatal gynecologic examination is open to personal interpretation.

Breech presentation is one of the important reasons for primary cesarean deliveries. In breech presentation, cesarean delivery is now preferred by many specialists because of the risk of complications such as hyperextension of the fetal head and entrapment of the fetal head in pelvic bony structures, foot presentation, and cord prolapse. Although cesarean delivery is not absolutely indicated in breech presentation, vaginal delivery may be preferred by explaining to families that vaginal delivery is more risky than cesarean delivery. In addition, the American College of Gynecology and Obstetrics (ACOG) supports the recommendation of cesarean delivery in breech presentation (18). Uçkan (14), found the rate of cesarean delivery due to breech presentation to be 5.7% in his study. Similarly, Aksoy et al (12). found the rate of cesarean delivery due to breech presentation to be 6% in their study. In our study, the rate of breech presentation among cesarean deliveries was found to be 6%, similar to the literature.

Another important reason for primary cesarean section is non-progressing labor. Uçkan (14), found the rate of cesarean delivery due to non-progressing labor to be 4.4% in his study. In our study, the rate of indication for non-progressive labor among indications for cesarean section was 4.8%, similar to the literature.

Other indications for cesarean section included multiple pregnancy (4.5%), other anomalies of presentation (transverse presentation, foot presentation, forehead-face presentation...) (3.8%), hypertensive diseases of pregnancy (3.1%), macrosomic fetus (2.8%), detached placenta (1%), cord prolapse (0.7%). All these results obtained from our study are similar to the literature.

Another important issue that should be emphasized, although not included here, is the perception of precious babies in patients conceived with Assisted Reproductive Techniques (ART), the

Table 1. Demographic and Obstetric Data

| Demographic and Obstetric Data | Years of Birth | | | | | | | | Total | | p value |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | | 2020 | | 2021 | | 2022 | | | | |
| | n | % | n | % | n | % | n | % | n | % | |
| **Mother Age Groups** | | | | | | | | | | | |
| 14-19 years old | 160 | 10.5 | 395 | 7.4 | 396 | 7.4 | 339 | 7.8 | 1290 | 7.8 | |
| 20-25 years old | 570 | 37.2 | 2010 | 37.8 | 2000 | 37.4 | 1629 | 37.4 | 6209 | 37.5 | |
| 26-31 years | 465 | 30.4 | 1700 | 31.9 | 1771 | 33.1 | 1393 | 32.0 | 5329 | 32.2 | |
| 32-37 years old | 240 | 15.7 | 875 | 16.4 | 832 | 15.6 | 706 | 16.2 | 2653 | 16.0 | 0.069* |
| 38-43 years old | 84 | 5.5 | 304 | 5.7 | 320 | 6.0 | 264 | 6.1 | 972 | 5.9 | |
| 44 years and older | 12 | 0.8 | 38 | 0.7 | 28 | 0.5 | 28 | 0.6 | 106 | 0.6 | |
| **Live and Stillbirth Rates** | | | | | | | | | | | |
| Live | 1519 | 99.2 | 5282 | 99.2 | 5312 | 99.3 | 4329 | 99.3 | 16442 | 99.3 | 0.916* |
| Dead | 12 | 0.8 | 40 | 0.8 | 35 | 0.7 | 30 | 0.7 | 117 | 0.7 | |
| **Gender** | | | | | | | | | | | |
| Girl | 752 | 49.1 | 2580 | 48.5 | 2618 | 49.0 | 2084 | 47.8 | 8034 | 48.5 | 0.673* |
| Male | 779 | 50.9 | 2742 | 51.5 | 2728 | 51.0 | 2275 | 52.2 | 8524 | 51.5 | |
| | Mean ± SD | | Mean ± SD | | Mean ± SD | | Mean ± SD | | Mean ± SD | | |
| **Gravide** | 3.23±2.073 | | 3.15±2.049 | | 3.27±2.129 | | 3.16±2.011 | | 3.20±2.068 | | 0.013** |
| **Parity** | 1.85±1.718 | | 1.80±1.694 | | 1.88±1.762 | | 1.79±1.664 | | 1.83±1.711 | | 0.047** |
| **Number of Abortions** | 0.37±0.800 | | 0.36±0.841 | | 0.39±0.869 | | 0.37±0.834 | | 0.37±0.845 | | 0.108** |
| **Pregnancy Week** | 38.05±2.229 | | 38.07±2.144 | | 37.98±2.161 | | 38.03±2.167 | | 38.03±2.164 | | 0.119** |

*Chi-Square Test , **One Anova Test

Table 2. Distribution of Indications for Cesarean Section by Years

| Indications for Caesarean section | Years of Birth | | | | | | | | | | p Value |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | | 2020 | | 2021 | | 2022 | | Total | | |
| | n | % | n | % | n | % | n | % | n | % | |
| **Previous Caesarean section** | 330 | 53.9 | 1166 | 52.8 | 1196 | 53.1 | 988 | 52.6 | 3680 | 53.0 | |
| **Fetal Distress** | 87 | 14.2 | 411 | 18.6 | 395 | 17.5 | 317 | 16.9 | 1210 | 17.4 | |
| **Breech Presentation** | 45 | 7.3 | 133 | 6.0 | 118 | 5.2 | 122 | 6.5 | 418 | 6.0 | |
| **Non-Progressive Action** | 39 | 6.4 | 87 | 3.9 | 118 | 5.2 | 87 | 4.6 | 331 | 4.8 | |
| **Other Anomalies of Presentation** | 27 | 4.3 | 91 | 4.1 | 58 | 3.1 | 78 | 4.2 | 264 | 3.8 | |
| **Multiple Pregnancy** | 22 | 3.6 | 105 | 4.7 | 105 | 4.7 | 82 | 4.4 | 314 | 4.5 | |
| **Macrosamic Fetus Hypertensive Diseases of Pregnancy** | 15 | 2.4 | 57 | 2.6 | 72 | 3.2 | 72 | 3.8 | 216 | 3.1 | 0.121* |
| **Detachment Placenta** | 14 | 2.3 | 66 | 3.0 | 69 | 3.0 | 47 | 2.5 | 196 | 2.8 | |
| **Cord Sagging** | 8 | 1.3 | 19 | 0.9 | 23 | 1.0 | 17 | 0.9 | 67 | 1.0 | |
| **Head Pelvis Discrepancy** | 5 | 0.8 | 15 | 0.7 | 14 | 0.6 | 16 | 0.9 | 50 | 0.7 | |
| **Other** | 5 | 0.8 | 22 | 1.0 | 22 | 1.0 | 14 | 0.7 | 63 | 0.9 | |
| **Total** | 16 | 2.7 | 37 | 1.7 | 51 | 2.4 | 39 | 2.0 | 143 | 2.0 | |

*Chi-Square Test

Table 3. Distribution of Birth Weights According to Years and Gender

| | Years of birth | | | | | |
|---|---|---|---|---|---|---|
| Birth weight averages by year and sex | 2019 | 2020 | 2021 | 2022 | Total | P value |
| | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | |
| Girl | 3011.38±481.18 | 3023.85±479.75 | 2994.61±495.32 | 3011.79±481.89 | 3010.03±485.62 | 0.752*** |
| Male | 3108.95±554.67 | 3130.36±548.25 | 3107.92±510.09 | 3203.21±523.45 | 3103.98±530.32 | |

***Two Factor Anova Test

number of which is increasing significantly every day, and in their environment. Nowadays, pregnancies are postponed due to many reasons such as women being more involved in working life and career rush, so the number of advanced age pregnancies and patients who become pregnant with ART is increasing. When the studies are examined, it is seen that most of the patients who become pregnant with ART are older women, have a high level of education, work in any job and generally live in urban centers (19,20). In addition, the perception of 'precious baby' is now widely accepted as a social indication all over the world, these pregnancies are generally considered as risky pregnancies by obstetricians and most of the women who become pregnant with these methods give birth by cesarean section (21,22).

The last issue that should be emphasized is cesarean sections performed due to maternal request. In recent years, the rate of cesarean delivery due to maternal request has been increasing significantly all over the world, especially in developed western societies. Many reasons such as fear of vaginal delivery, genital aesthetic anxiety, pelvic organ prolapse, urinary incontinence and desire for tubal ligation can be cited as the main reasons for this increase in cesarean section rates. In our country, there are no studies on maternal elective cesarean deliveries, but we think that maternal elective cesarean deliveries are performed with different indications and their rates are considerably high.

## CONCLUSION

In conclusion, we can say that cesarean section rates in our clinic, according to the results of our study, and according to the literature review, cesarean section rates in our country are much higher than the rates aimed by authorized institutions. The increase in cesarean section rates is a common problem not only in our country but also in all developed societies. In our country, various studies are carried out within the Ministry of Health to reduce these rates, but as is evident from the results, these are insufficient. When explicitly evaluated for our country, there are many reasons for this. Mainly, the working conditions and social rights of physicians and all health workers should be improved, and we think that sufficient and constructive efforts should be made to remove the pressure on physicians due to medico-legal reasons and malpractice lawsuits. In addition, studies should be conducted to reveal the increase in primary cesarean section rates, and joint studies should be carried out with the participation of universities, training and research hospitals, and public and private hospitals to reduce the indications above acceptable rates.

**Author(s) contribution(s):** **EE,** the corresponding author, wrote this article. **AE** contributed to the study by making statistical analyses and interpretations of the study. **EE** was responsible for the drafting of the manuscript.

**Conflict of interest:** All authors declare no conflict of interest in this study.

**Ethical approval:** Ethical permission for the study was obtained from Ağrı İbrahim Çeçen University Scientific Research Ethics Committee (Date: 08.11.2022, Decision No: 235).

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