

# An evaluation of cesarean rate in turkey by the Robson ten group classification system: How to reduce cesarean rates?

Türkiye’de sezaryen oranlarının Robson ten group classification sistemi ile değerlendirilmesi; sezaryen oranları nasıl azaltılır?

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## Abstract

Aim: Caesarean section (CS) rates, as is the case in the world, showed a significant increase in Turkey over the last decade. The World Health Organization has approved the Robson10-Group Classification System (TGCS) as a global standard to facilitate the analysis and comparison of CS rates. The present study aimed to analyze the TGCS to CS ratio in Turkey and determine CS reduction strategies.

Methods: The data for this retrospective cohort study were collected from the records of women who gave birth between January 1, 2011 and December 31, 2014 in a tertiary center. All data were obtained from the hospital database and patient files. The patients were grouped using TGCS. The contribution of each group to CS ratios was determined.

Results: Between 2011 and 2014, a total of 25,653 out of 63,476 deliveries were performed by CS. It was determined that the CS rate was 36% in 2011 and increased to 44% in 2014 ( $P<0.001$ ). According to TGCS, the biggest contribution to this increase belonged to the Class 5 group. This group included 40.7% (2073/5096) of all patients undergoing cesarean section in 2011, 37.3% (2045/5480) in 2012, 27.1% (1859/6857) in 2013, and 36.8% (3025/8220) in 2014. While the rates of patients in Class 1,3 and 10 increased significantly over the years in which the study data were evaluated, rates in Class 2 and 4 decreased ( $P<0.001$ ).

Conclusion: According to TGCS, strategies to prevent the increase in CS ratios should be developed to reduce Class 1, 3 and 5 patients. In this context, strategies to reduce CS ratios can be established through obstetric practices and the health policies of countries.

**Keywords:** Primary cesarean, Rising cesarean rates, Robson classification

## Öz

Amaç: Sezaryen (CS) oranları tüm dünyada olduğu gibi Türkiye’de son on yılda ciddi bir artış göstermiştir. Dünya Sağlık Örgütü, CS oranlarının analizini ve karşılaştırılmasını kolaylaştırmak için Robson10- Group Sınıflandırma Sistemini (TGCS) küresel bir standart olarak onaylamıştır. Bu çalışmanın amacı Türkiye’de TGCS ile CS oranlarının analiz edilerek CS’yi azaltma stratejilerinin belirlenmesidir.

Yöntemler: Bu çalışma, 1 Ocak 2011 ve 31 Aralık 2014 tarihleri arasında üçüncü basamak bir merkezde doğum yapan kadınların kayıtları toplanarak yapılan retrospektif bir kohort çalışması olarak planlandı. Tüm veriler hastane veri tabanından ve hasta dosyalarından elde edildi. Hastalar TGCS kullanılarak gruplandırıldı. Her grubun CS oranlarına katkısı belirlendi.

Bulgular: 2010-2014 tarihleri arasında 63.476 doğumdan 25.653’ü sezaryen ile gerçekleştirildi. CS oranı yıllar içinde istatistiksel olarak anlamlı artış göstermekteydi ( $P<0.001$ ). TGCS ye göre bu artışa en büyük katkı Sınıf 5 grubuna aitti. Bu grup, 2011 yılında sezaryen yapılan tüm hastaların %40,7’sini (2073/5096), 2012 yılında %37,3’ünü (2045/5480), 2013 yılında %27,1’ini (1859/6857), 2014 yılında ise %36,8’ini (3025/8220) oluşturmaktaydı. Çalışma verilerinin değerlendirildiği yıllar içinde Sınıf 1, 3 ve 10’daki hasta oranları anlamlı olarak artarken, Sınıf 2 ve 4’teki oranların azalmakta olduğu görüldü ( $P<0.001$ ).

Sonuç: 2011’de %36 olan CS oranının, 2014’te %44’e yükseldiği saptanmıştır. TGCS ye göre CS oranlarındaki artışı önleme stratejileri Sınıf 1, 3 ve 5 hastalarının azaltılması yönünde geliştirilmelidir. Bu çerçevede CS oranlarını azaltacak stratejiler kadın hastalıkları doğum uzmanlarının uygulamaları ve ülkelerin sağlık politikalarının düzenlenmesiyle oluşturulabilir.

**Anahtar kelimeler:** Primer sezaryen, Artan sezaryen oranları, Robson sınıflaması

## Introduction

The first cesarean section (CS) was performed in 1881 by the German gynecologist Ferdinand Adolf Kehler. It is without question that this procedure, which had almost always ended with a “dead mother and a dead fetus”, is now a life-saving operation that has almost always ended with a “surviving mother and a surviving baby” [1,2]. CS is one of the most common and increasing surgical interventions in the world today. A presentation on October 13, 2018 at Brazil FIGO World Congress, reported that CS rates doubled between 2000 and 2015 as a global fact. This increase was associated with many medical, legal and social factors [3-5]. The ideal cesarean ratio is a topic of discussion for women and healthcare professionals. The World Health Organization (WHO) states that a CS rate of 10-15% can be regarded acceptable. However, many countries cannot catch these rates. CS rates have been reported to be between 24.3 - 32% in North America, 32.3 - 44.3% in Latin America, and 19.6 - 26.9% in Western Europe. In Germany, while cesarean rates were 15.3% in 1991, this rate increased to 31.7% in 2012 [6]. CS applications in absolute CS indications such as contracted pelvis, placenta previa, malpresentations like transverse lie, brow and uterine rupture are life-saving for the fetus and mother. However, in the low-risk group, CS poses a greater risk than vaginal birth, causing an increase in blood transfusions, hysterectomy and maternal mortality [7]. With all these effects and the increase in costs, the increase in CS rates emerges as an important public health problem.

To investigate the mechanisms underlying the global rise in CS rates, it is essential to identify the risks of admission of patients to CS. Accordingly, the Robson Ten Group Classification System (TGCS), which is standard, reliable, consistent, and comparable, is adopted. This system provides optimal maternal and fetal epidemiological information and is considered an effective monitoring tool.

The present study aimed to determine the cesarean rates in Turkey according to the TGCS Robson, evaluate the possible causes of this popular trend in recent years and prevention strategies.

## Materials and methods

The data for this retrospective cohort study were collected from the records of women who gave birth between January 1, 2011 and December 31, 2014 at University of Health Sciences Etlik Zubeyde Hanim Women's Health Education and Research Hospital. All data were obtained from the hospital database and patient files. Approval from the Institutional Local Ethics Committee and Institutional Education and Planning Committee of Etlik Zubeyde Hanim Women's Health Education and Research Hospital was obtained (10.04.2017/07).

To make the findings of the present study comparable to other studies, the sample group was limited to women whose gestational age was a minimum of 24 weeks or at least a 500-g birth. Relevant information, including previous births (nulliparous or multiparous), number of fetuses (single or multiple), gestational age at the time of delivery, fetal presentation (cephalic, breech, or transverse), and onset of labor and delivery (spontaneous, induced, or planned CS), were

directly obtained from the review of the electronic and file medical record system. Also, patients' age, gestational week, fetal birth weights and cesarean indications were determined. All births included in the study were classified according to the modified Robson 10-group clinical criteria approved by the Society of Obstetricians and Gynecologists of Canada (SOGC) [8].

### Robson Ten Group Classification System

All women were classified according to the following characteristics based on TGCS (Table 1): (1) parity (nulliparity / multiparity / multiparity with previous caesarean section), (2) the number of fetuses (single / multiple), (3) presentation of the fetus (cephalic / breech / transverse), (4) onset of labor (spontaneous/induced/prelabor caesarean section), (5) gestational age (term or preterm)

Nulliparity was defined as women who gave birth for the first time while multiparity was defined women who previously gave birth once or more. Term pregnancy was defined as those who gave birth at the 37th gestational week or later while preterm pregnancy was defined for those who gave birth before the 37th gestational week. Induction of labor was defined as the use of any medication, amniotomy or cervical balloon in women just before labor. Cesarean delivery rates were calculated by dividing the number of cesarean births by the number of births in the study population.

Table 1: The classification of Robson criteria description of all groups

1. Nulliparous, single cephalic, >37 wks. in spontaneous labor
2. Nulliparous, single cephalic, >37 wks., induced or CS before labor
3. Multiparous (excluding previous CS), single cephalic, >37 weeks in spontaneous labor
4. Multiparous (excluding previous CS), single cephalic, >37 weeks, induced or CS before labor
5. Previous CS, single cephalic, >37 weeks
6. All nulliparous breeches
7. All multiparous breeches (including previous cesarean section)
8. All multiple pregnancies (including previous cesarean section)
9. All abnormal lies or oblique lie (excluding breech presentation) (including previous cesarean section)
10. All singleton, cephalic, ≤36 weeks (including previous cesarean section)

### Statistical analysis

The statistical package software SPSS 20 (IBM Corp. released 2011. IBM SPSS Statistics for Windows, version 20.0, Armonk, NY: IBM Corp.) was used to evaluate the data. Data was expressed as mean (standard deviation) and in percentages. Continuous variables were investigated using analytical methods (Kolmogorov-Smirnov / Shapiro-Wilk's test) to determine whether or not they are normally distributed. If the numerical data was non-parametric, the Kruskal Wallis test was conducted, if it was parametric, a One-way ANOVA test was carried out and Bonferroni correction was used for the post-hoc assessment. Relationships between categorical variables were analyzed by the Chi-square test.  $P < 0.05$  was considered statistically significant.

## Results

Over the specified 4-year period, 63,476 births were included in the study. The demographic characteristics of the patients are given in Table 2. The mean age of the patients was 26.9 (5.6) years, the mean weight of the newborns was 3182.3 (594.5) g, and the mean gestational week was 38.4 (2.3) weeks. It was observed that 59.6% of the labors were performed by vaginal delivery and 40.4% occurred by cesarean section. The cesarean rate increased statistically significantly over the years ( $P < 0.001$ ). It was determined that the CS rate was 36% in 2011

and increased to 44% in 2014 (Figure 1). There were no statistically significant differences in gender ratios by years ( $P=0.267$ ). Multiparity rate was significantly higher in other groups in 2014 ( $P<0.001$ ).

The differences in birth rates between TGCS by years are shown in Table 3 and Figure 2. Accordingly, the rates of cesarean patients in Class 1 and 3 (nulliparous and multiparous women with singleton cephalic full-term pregnancy, with spontaneous labor without previous CS) increased significantly over the years. Class 2 and 4 (nulliparous and multiparous women with singleton cephalic full-term pregnancy who required induction of labor or underwent pre-labour CS) decreased ( $P<0.001$ ). The largest patient group was in Class 5 (Patients with previous cesarean history, singleton, 37th week of gestation and later, and underwent cesarean section). This group included 40.7% (2073/5096) of all the patients undergoing cesarean section in 2011, 37.3% (2045/5480) in 2012, 27.1% (1859/6857) in 2013, and 36.8% in 2014. (3025/8220). In Class 10 (preterm, singleton, cephalic), CS rates increased significantly over the years ( $P<0.001$ ). All the cesarean indications are shown in Table 4. The most common indication was fetal distress while the second was cephalopelvic disproportion (CPD). These two indications have been increasing over the years. The third most common cause was macrosomia and it did not differ significantly over the years.

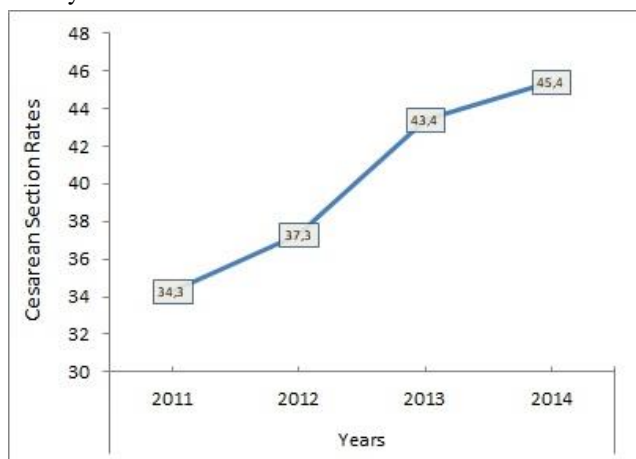


Figure 1: Demonstrating rising increment of overall C/S rates in years between 2011 and 2014

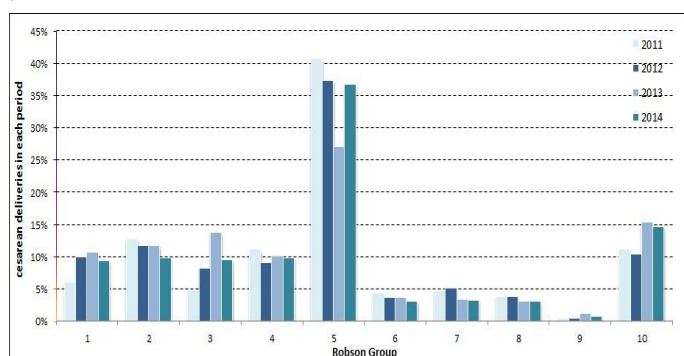


Figure 2: Contribution of each group in the Robson Ten Group Classification System to the overall caesarean section prevalence

Table 2: Demographic characteristics of the patients

	Total n=6347 6	2011 n=14878	2012 n=14685	2013 n=15803	2014 n=18110	P- value
Age (years)	26.9 (5.6)	26.5 (5.6)	26.6 (5.6)	26.9 (5.7)	27.2 (5.7)	<0.001
Birth weight (kg)	3182.3 (594.5)	3180.7 (590.3)	3203.5 (575.9)	3179.9 (614.3)	3163.2 (600.6)	<0.001
Birth week	38.4 (2.3)	38.4 (2.2)	38.4 (2.2)	38.4 (2.4)	38.3 (2.4)	<0.001
Birth type (%)						
VD	59.6 (37823)	9782 (65.7)	9205 (62.6)	8946 (56.6)	9890 (54.6)	<0.001
CS	40.4 (25653)	5096 (34.3)	5480 (37.4)	6857 (43.4)	8220 (45.4)	
Gender (%)						0.267
Male	51.6 (32737)	51.9 (7722)	51.1 (7504)	52.0 (8219)	51.3 (9292)	
Female	48.4 (30739)	48.1 (7156)	48.9 (7181)	48.0 (7584)	48.7 (8818)	
Multi/Nulli-parity (%)						<0.001
Multiparity	59.6 (38436)	62.3 (9272)	63.1 (9256)	58.3 (8743)	56.1 (11165)	
Nulliparity	40.4 (26016)	37.6 (5605)	36.8 (5409)	41.7 (6259)	43.9 (8743)	

Note: Unless otherwise specified, results are presented as mean (standard deviation). VD: vaginal delivery, CS: cesarean section.

Table 3: According to the Robson classification system, the changes in the cesarean rates in the groups according to the years

Year	2011 % (n)	2012 % (n)	2013 % (n)	2014 % (n)	P-value
1	10 (310)	18.1 (544)	31.6 (730)	28.7 (767)	< 0.001
2	46.5 (651)	46.9 (641)	32.3 (802)	27.1 (805)	< 0.001
3	5.3 (244)	9.5 (453)	28.8 (945)	24.1 (781)	< 0.001
4	37.6 (564)	37.4 (501)	22.2 (697)	23.3 (804)	< 0.001
5	99.4 (2073)	99.7 (2045)	96.8 (1859)	100 (3025)	< 0.001
6	99.1 (224)	99.5 (204)	99.6 (249)	99.6 (260)	0.865
7	96.4 (242)	99.6 (284)	93.9 (231)	99.6 (262)	< 0.001
8	92.8 (194)	93.3 (209)	94.1 (209)	96.2 (253)	0.393
9	100 (25)	100 (29)	100 (79)	100 (57)	0.814
10	38.7 (569)	40.4 (570)	56.4 (1056)	63.3 (1206)	< 0.001
Total	34.3 (5096)	37.3 (5480)	43.4 (6857)	45.4 (8220)	

Data presented as % (n)

Table 4: Distribution of cesarean indication in our institution was different from Robson's criteria between 2011 and 2014

Indications	2011 n (%)	2012 n (%)	2013 n (%)	2014 n (%)	Total n (%)
Fetal distress	1652 (5.5)	1764 (6.0)	1920 (5.7)	2202 (5.8)	7538 (29.1)
CPD	628 (1.7)	908 (3.0)	1162 (3.3)	1515 (3.8)	4213 (16.3)
Non progressive labor& unsuccessful augmentation	458 (1.2)	464 (1.5)	510 (1.2)	948 (1.7)	2380 (9.2)
Macrosomia	588 (1.6)	694 (2.3)	1178 (3.4)	1128 (2.5)	3858 (14.9)
Multiple pregnancy	488 (1.3)	418 (1.4)	557 (1.3)	613 (1.4)	2076 (8.0)
Primipara aged	83 (0.27)	88 (0.29)	64 (0.15)	94 (0.24)	329 (1.3)
In vitro fertilization pregnancies	65 (0.10)	58 (0.19)	85 (0.21)	65 (0.15)	273 (1.1)
Owing worse obstetric history	74 (0.10)	40 (0.13)	23 (0.05)	17 (0.02)	154 (0.6)
PPROM	554 (1.5)	688 (2.3)	778 (2.1)	994 (2.6)	3014 (11.6)
FGR	135 (0.30)	18 (0.06)	33 (0.04)	36 (0.07)	222 (0.9)
Doppler abnormalities	-	-	78 (0.24)	71 (0.17)	149 (0.6)
Preeclampsia	136 (0.49)	160 (0.54)	208 (0.34)	183 (0.38)	687 (2.7)
Systemic disorders	-	-	-	165 (0.26)	165 (0.6)
Maternal anxiety	-	-	25 (0.07)	14 (0.01)	39 (0.2)
Vaginismus & previous vaginal surgical history	81 (0.08)	41 (0.13)	39 (0.10)	75 (0.13)	236 (0.9)
Condyloma	69 (0.12)	23 (0.06)	19 (0.03)	19 (0.03)	130 (0.5)
Placental pathologies	1/150	1/150	1/150	1/150	
Others	85 (0.23)	116 (0.39)	178 (0.46)	81 (0.16)	460 (1.8)
Total	5096	5480	6857	8220	25653

CPD: cephalopelvic disproportion, PPRM: preterm premature rupture of membranes, FGR: fetal growth restriction. Other indications included maternal eyes disorders, lumbosacral disc hernia, congenital hip dislocation, fetal anomalies, vulvar varis and oligohidramnios

## Discussion

The present study shows that there is a significant increase in the rate of CS in Turkey, as in the world. In the 4-year period in the study, the CS rate was 40.4%. It was seen that the biggest contributions to the increase in CS rates were in Robson 1-5 and Robson 10 groups.

According to the Organization for Economic Co-operation and Development (OECD) data in 2011, Turkey is one of the countries with the highest CS rate (47%) with Mexico and China. In Turkey, the cesarean rate was 6.99% in 1993 and increased to 21.2% in 2001, to 37% in 2008 and to 46.7% in 2011 [9]. The repeated or previous CS ratio was 14.1% and constituted the highest proportion of all CS cases in our institution. In the literature, it was seen that the contribution to increasing CS rates was mostly in Robson 5 (Previous CS, single cephalic, > 37 weeks). This result is not surprising since the primary CS rates from America to Ethiopia, France to Canada increased significantly and Robson 5 group increases these rates with the domino effect.

The absence of a decrease in this group was also related to the increase in patients in Groups 1 and 3 and the performance of vaginal birth after cesarean (VBAC) at lower rates than desired. 'Once cesarean, always cesarean' is generally accepted by obstetricians and patients. Previous large-scale studies have shown that complications associated with VBAC are rare [10]. This result did not increase the rate of vaginal deliveries. The lack of a vaginal delivery option for women with previous cesarean delivery had led to an increase in the number of patients who admitted to private hospitals for VBAC. This was thought to be related to the increased complication rates of VBAC [11]. Health policies also have a direct effect on this clinical outcome. In the USA, VBAC rates decreased from 28.3% to 9.2%, and transactions were excluded from the insurance coverage, stating that VBAC may be associated with fetal and maternal complications [12]. As stated by the American Congress of Obstetrician and Gynecologists (ACOG) in 2004, patients who had a cesarean section with a lower segment transverse incision should be monitored during the active labor and a vaginal delivery should be tried if i) the patient can be taken to cesarean section in case of emergency, ii) the patient has a clinically appropriate pelvis, iii) the fetus is less than 4000 grams, iv) no other uterine surgery or rupture anamnesis are present [13]. Robson-1 and Robson 3 groups also had a significant impact on increased CS rates [14-16]. Limiting CS in these groups have been shown as the most effective way to prevent proportional increases in CS.

Examining the Robson 1 group, it was seen that macrosomic fetus, fetal distress and CPD are the most common indications. In our hospital, pregnant women are evaluated with ultrasound before the onset of spontaneous labor or the induction of labor. If fetal macrosomia is suspected (estimated fetal weight  $\geq 4000$  grams or fetal abdominal circumference  $\geq 360$  mm), the patient is routinely taken to CS. Also, the diagnosis of non-reactive tocoardiographic findings was related to increased cesarean rate in Robson 1 [12]. In the present study, the highest CS indication was fetal distress. Other factors contributing to the increase in this group are socio-economic status, physicians' fear of litigation, and mother's preference for CS. Compared to less

developed countries such as Latin countries, primary CS rates in economically developed countries seem to be higher CS [17]. The increase in social status is directly related to the fulfillment of the mother's desire and this is thought to contribute to the increase in CS rates. CS preference of patients can be attributed to reasons such as pregnancy at an advanced age, decreased parity, the increase in pregnancies caused by assisted reproductive techniques, and the fact that patients do not want to feel pain. An important rationale for those who advocate birth with elective cesarean is that this 'non-traumatic delivery' form can prevent intrapartum neurological damage and cerebral palsy (CP). However, data on the effects of delivery on acute and long-term neurological prognosis are limited and the results are contradictory. Despite a five-fold increase in the frequency of cesarean delivery, the fact that the CP prevalence has not changed much is a good example [18, 19]. In a study conducted in Turkey, it was seen that 59% of obstetricians give consent to the optional cesarean section [20]. However, optional cesarean delivery is not carried out in public hospitals. Therefore, the patients who contribute to Group 5 are mostly Group 1 patients who underwent CS in private hospitals [21].

Also, according to the analysis results, the ratio of the Robson 3 group to all CS deliveries increased 2.5-3.5-fold in each year from 2011 to 2014. One of the common reasons for CS in multiparous patients in Turkey is the simultaneous tubal ligation application. CS can also be preferred in advanced age and maternal and neonatal diseases. The Robson 6-7 (all nulliparous breeches and All multiparous breeches, including previous cesarean section) groups did not differ significantly over the years. External cephalic version is not carried out in our clinic. All pregnant women in breech presentation without vaginal cervical dilatation during vaginal examination are delivered with CS. Similarly, in patients in the Robson 8 group (multiple pregnancy), there were no significant changes in the CS rates. ACOG states that if it is the first twin (presenting fetus), breech or transverse labor, CS should be the first choice [22]. Also, many clinicians believe that the best form of delivery is cesarean for pregnancies complicated by two, three or more fetuses [23]. It was seen that Robson 10 (All singleton, cephalic,  $\leq 36$  weeks (including previous cesarean section) group increased significantly during the study. This can be associated with the increase in referrals and admissions to our hospital in the complications related to IVF treatments and prematurity.

Robson TGCS is a useful tool that can be applied freely by all healthcare institutions to facilitate the analysis of cesarean delivery rates and it is a guide for strategies according to the increases and decreases in CS rates. The strategies for the reduction of Robson 1-3 are influenced by the presence of country-specific factors. With the Health Transformation Law which was initiated in 2002 in Turkey, CS depending on the mother's request was banned. However, the CS rate was 21% in 2002 and increased to 50% in 2014. Another important detail is the increase in malpractice cases with high compensation up to 35% in parallel with this increase. This may have changed the attitudes, behaviors and practices of the specialists. The studies show that gynecologists and obstetricians act more defensively due to medico-legal fears compared to other branches [24]. This defensive approach has important effects on medical procedures

and the health system. For instance, the use of maneuvers such as the external cephalic version and vacuum-forceps applications appear to be significantly reduced [25-27]. The decrease in these practices may also cause beginner obstetricians to not be able to perform intervened deliveries. Similar problems were discussed in a study conducted in Egypt [27]. Another important point is that legal responsibility is not given to the midwives during the labor process. It was observed that midwives play a more active role in childbirth, as in countries such as Sweden, where low CS rates have been reported to be achieved [28]. Legal liability regulations addressing the midwives in Turkey are not available yet.

### Limitations

Strength of the present study was that it examined all the births in the four-year-period in Turkey's second largest maternity hospital. The hospital database was suitable for classification and records were fully reachable. The data were evaluated with accuracy and transparency. In contrast, not evaluating other parameters related to CS such as maternal characteristics, neonatal characteristics and long-term complications of the operation can be considered as the limitations of our study.

### Conclusions

With the present study, it was determined that the CS rate was 36% in 2011 and increased to 45% in 2014. TGCS data showed that the key point in reducing CS rates is to decrease Groups 1, 3 and 5. Considering the sociocultural and legal characteristics of Turkey, it was thought that gynecologists and obstetricians play a key role in the reduction of cesarean delivery rates. Implementation of corrective laws on personal rights of physicians, such as malpractice cases and economic concerns can be an effective measure for Turkey and countries with similar problems.

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