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Original Research Article

## Characteristics of deliveries at a tertiary care hospital in Turkey: results from a retrospective analysis (2012-2016)

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### ABSTRACT

**Background:** Although the choice of a particular method of birth delivery by the pregnant woman is a modern, complex and controversial subject all over the world, the rate of caesarean delivery has risen to nearly 50% in western countries. Apart from medical reasons, several non-medical factors are also involved in this choice, and they comprise the socioeconomic conditions, ethical/legal concerns and psychological and cultural characteristics of the patients and doctors. In this study, we aimed to evaluate the demographic and clinical characteristics of pregnant women who gave birth in a tertiary care hospital between October 2012 and June 2016.

**Methods:** The patients' charts of pregnant women who presented to the Canakkale Onsekiz Mart University hospital between October 2012 and June 2016 and who gave birth through either vaginal or caesarean delivery were retrospectively analysed. The patients' age, delivery type, weeks of pregnancy at delivery, number of pregnancies and caesarean indications were recorded.

**Results:** In this study, we retrospectively analysed 2012 pregnant women. The mean age of the pregnant women was  $28.9 \pm 5.4$  years. The mean gravida and parity of pregnant women were  $1.9 \pm 1.0$  and  $1.5 \pm 0.7$ , respectively. Regardless of the delivery type, the mean pregnancy weeks were found to be  $38.6 \pm 1.9$  weeks. The mean pregnancy weeks of patients undergoing caesarean delivery were  $38.4 \pm 1.8$  weeks. The primary caesarean rates were 52.81%. The most common caesarean delivery indications were foetal distress, cephalopelvic disproportion and presentation anomalies.

**Conclusions:** The steady increase in caesarean delivery rates has become a major cause of concern worldwide. The reasons for this phenomenon are mostly related to advanced age; foetal distress, especially one that is detected in continuous foetal monitoring; intrauterine growth retardation; presentation anomalies and multiple gestation. To avoid unnecessary caesarean births, mothers, especially nulliparous mothers, should be persuaded to undergo vaginal delivery.

**Keywords:** Caesarean delivery, Delivery, Pregnancy, Vaginal birth

### INTRODUCTION

Choosing the optimal mode of delivery (vaginal versus caesarean section) still remains a highly debatable issue because of the individual risk factors of both delivery types.<sup>1</sup> In this context, vaginal birth is generally the preferred method of delivery that has been viewed as the unquestioned mode of birth, whereas caesarean delivery has been perceived as a risky procedure designed for

women with medical indications.<sup>2</sup> Unfortunately, in recent years, caesarean births have steadily increased worldwide despite the recommendations of the American College of Obstetricians and Gynecologists (ACOG) that vaginal delivery should be applied unless there are maternal or foetal indications for caesarean delivery.<sup>3</sup> The major factors that have been proposed for the observed increase in caesarean births are advanced maternal age, multiple pregnancies, breech presentation, suspected low

infant birthweight, private hospital status and increasing maternal bodymass index.<sup>4</sup> Today, the frequency of completed births by caesarean section differs among countries. According to statistical reports, the highest caesarean rates is reported to be in the United States (24%), followed by Canada (21%), Denmark (13%), England (10%) and Japan (7%).<sup>5,6</sup>

Despite its increased perception of safety, which has contributed to the worldwide increase in caesarean section rates, it also carries the risks of hysterotomy and laparotomy.<sup>7</sup> Moreover, it poses a higher risk of some maternal and foetal complications than does a vaginal delivery. Unnecessary caesarean section involves increased physiological risks to the mother and foetus as well as increased psychosocial risks to the infant, mother, father and their respective relationships. On the other hand, the assessment of whether the caesarean section operation poses an intrinsic risk to the mother or the foetus can be sometimes difficult to interpret. For this reason, caesarean birth should only be considered in the presence of a risk for the mother, foetus, or both.<sup>8</sup> In developing countries, this dilemma can be resolved by the improvement of maternal and perinatal health by strengthening their health systems.

This study was designed to estimate caesarean section rates and the most common indications for caesarean section at the Gynaecology and Obstetrics clinic of Canakkale Onsekiz Mart University (COMU) hospital.

**METHODS**

The patients' charts of pregnant women who presented to the COMU hospital between October 2012 and June 2016 and who gave birth through either vaginal or caesarean delivery were analysed retrospectively.

The patients' age, delivery type, weeks of pregnancy at delivery, number of pregnancies and caesarean indications were recorded retrospectively. The indications of caesarean deliveries were evaluated according to the Robson classification system (Table 1).

9 Ethical approval for the study was obtained from the clinical studies' ethical committee of COMU Faculty of Medicine (Number: 2016-20-08).

**Statistical analysis**

The data obtained were analysed using SPSS version 19.0. Normality of the collected data was tested using the Kolmogorov–Smirnov test. The mean, standard deviation, minimum and maximum values, frequency and percentages were used to present the descriptive data. The Mann–Whitney U test was used because the inter-group comparisons were not normally distributed. A P-value below 0.05 was considered statistically significant.

**Table 1: Cesarean indications according to Robson classification system.**

Group	Description
Group 1	Nulliparous, single cephalic, ≥ 37 weeks, in spontaneous labour
Group 2	Nulliparous, single cephalic, ≥ 37 weeks, induced (including prelabour CS)
Group 3	Multiparous (excluding previous CS), single cephalic, ≥ 37 weeks, in spontaneous labour
Group 4	Multiparous (excluding previous CS), single cephalic, ≥ 37 weeks, induced (including prelabour CS)
Group 5	Previous CS, single cephalic, ≥ 37 weeks
Group 6	All nulliparous breeches
Group 7	All multiparous breeches (including previous CS)
Group 8	All multiple pregnancy (including previous CS)
Group 9	All transverse / oblique lie (including previous CS)
Group 10	All preterm single cephalic, <37 weeks, including previous CS

**RESULTS**

Total of 2012 pregnant women who had given birth at the COMU Faculty of Medicine hospital between October 2012 and June 2016 were included in the present study. Among these births, 1965 were singletons and 47 were twins. Other than the normal head-down births, 2.2% (n=44) of all births were breech presentation and 2.9% (n=58) were either on one side, oblique, or united. Among the singleton births, 63.15% (n=1241) of head-down births underwent caesarean and 36.85% (n=724) underwent vaginal delivery. About 4.65% (n=91) of the mothers with breech presentation underwent vaginal delivery.

**Table 2: Demographic characteristics of study group.**

	Vaginal delivery (n: 687)		Cesarean delivery (n: 1325)		P value
	Mean±SD	Min.-Max.	Mean±SD	Min.-Max.	
Age (year)	27.4±5.0	15-43	29.6±5.4	15-47	<0.001*
Gravida	1.7±1.0	1-9	2.0±1.1	1-11	<0.001*
Parity	1.5±0.7	1-6	1.6±0.6	1-5	<0.001*
Pregnancy week at delivery	39.0±1.9	22-41	38.4±1.8	27-42.1	<0.001*
Weight of newborn (grams)	3157.8±503.3		3146±602.7		NS

Mann-Whitney test applied \*:Statistically significant; NS: Not significant; SD: Standard Deviation;

The mean age among the participants was 28.9±5.4 years. The youngest age was 15 and the oldest was 49. The mean first pregnancy age was 26.6±4.8 (min-max: 15-49) years. The mean age was 27.4±5.0 years among those who underwent vaginal delivery and 29.6±5.4 among those who underwent caesarean birth. The mean age on birth in the caesarean group was significantly higher than that in the vaginal birth group (p<0.001). The gravida of the pregnant women was between 1 and 11, and the mean gravida was 1.9±1.0. The gestational week at birth was significantly higher among the women who had vaginal birth (p<0.001). The mean gestational week at birth of the study population was 39.0±1.9 in the vaginal birth group and 38.4±1.8 in the caesarean group. The mean infant weight was higher in the vaginal birth group (3157.8±503.3 g) as compared to the caesarean group (3146±602.7 g), but the difference was found to be statistically non-significant. Table 2 summarises the demographic characteristics of the pregnant women included in the study.

**Table 3: Pregnancy weeks of singleton pregnancies.**

	Week	n	%
Preterm delivery	<32	16	0.8
	32-33	36	1.8
	34-36	184	9.1
Term delivery	>37	1776	88.3

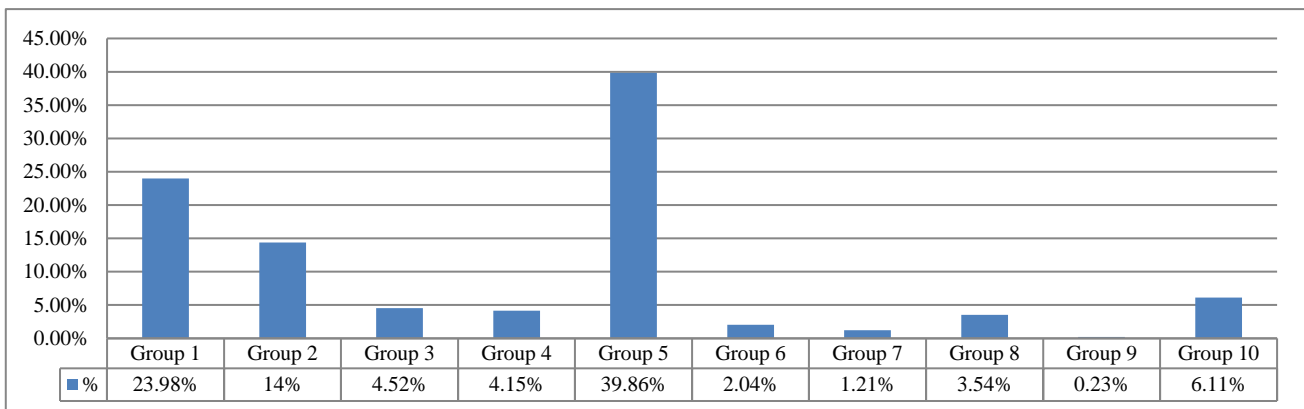
Among the deliveries, 11.7% (n=236) were preterm (before the 37th gestational week) and 88.3% (n=1776) were term (Table 3). The mean gestational week of the

twins (n=47) at birth was 36±1.7 (min-max: 30.4–38.4). Among the twin births, 21 (44.68%) were born between 37 and 41 weeks, 23 (48.9%) were born between 34 and 36 weeks, and 3 (6.42%) were born before 33 weeks of gestation.



**Figure 1: Cesarean delivery rate in the current study according to Robson classification.**

The mean weight of the twins at birth was 2374.5±414.5 g. Among all deliveries (singletons and twins), the weight of 82.3% (n=1656) of the newborns were 2500–3999 g, 13% (n=262) were below 2500 g (low birth weight) and 4.8% (n=94) were 4000 g or higher. According to the Robson classification system, the primary caesarean delivery rate was 52.81% and the repeat caesarean delivery rate was 42.16% (Figure 1).



**Figure 2: Cesarean indications in the current study according to Robson classification.**

The caesarean delivery rate in women aged >35 years was 36.3% and that in women aged <35 years was 56.9%. The caesarean delivery rate was found to be significantly higher in pregnant women aged less than 35 years (p<0.001). According to the Robson classification system, the most frequent cause of caesarean section is

group 5 (previous cesarean, single cephalic and ≥37 weeks) (Figure 2).

**DISCUSSION**

Caesarean birth, which has recently gained worldwide practice, has led all countries to reconsider their health

policies and take measures.<sup>10</sup> The benefits of caesarean birth for both the mother and the baby are obvious as long as it is used in certain circumstances. However, the negative effects produced by an unnecessary caesarean section on the health system of countries should not be underestimated.

The cumulative effect of a steadily increasing primary caesarean section rate appears as an increased caesarean birth rate in health statistics. One of the ignored issues is the false belief that a woman who had previously undergone caesarean birth should do the same in the second or later births.<sup>11</sup> This situation is an incorrect belief that is accepted by majority of physicians for different reasons.<sup>12</sup> Merrill and Gibbs reported that vaginal birth could safely be performed in 85% of patients with a previous caesarean section.<sup>13</sup> Recent studies also suggested that vaginal birth could be safely performed in 60%-80% of patients with a previous caesarean birth.<sup>14</sup> The important point to consider is the type of previous caesarean section. Note that vaginal birth may come with a 0.2%-1.5% risk of rupture in patients who had undergone a previous caesarean birth through an inferior segment transverse incision, which is the most frequently used technique.<sup>15,16</sup>

Currently, the most common cause of a caesarean section is the presence of a previous caesarean section. In the United States, the rate of primary caesarean birth was 14.6% in 1996 and increased to 23.4% in 2007. The current rate of primary section in the United States is 32.5%.<sup>17,18</sup> These statistics confirm the fact that the most important step in reducing the rate of total caesarean is the fight against primary caesarean section. Barber et al. presented the indications for primary caesarean birth as follows: 32% due to foetal distress, 18% due to delayed labour, 16% due to multiple pregnancies, 10% due to high birth weight, 10% due to preeclampsia, 8% due to the desire of the mother, 5% due to causes related to the mother or the baby and 1% due to other reasons.<sup>19</sup> According to our study, the most common causes of primary caesarean birth were foetal distress and cephalopelvic disproportion, followed by presentation abnormalities, delayed labour, multiple pregnancies and preeclampsia. The most frequent indication was group 5 (previous cesarean, single cephalic and  $\geq 37$  weeks) according to the Robson classification system.

In present study, the mean age of the mothers was  $28.9 \pm 5.4$  years, which ranged between 15 and 49 years. The mean age was  $27.4 \pm 5.0$  years in the vaginal birth group and  $29.6 \pm 5.4$  years in the caesarean group, and their difference was statistically significant. In a study from our country, the mean age of women undergoing caesarean section was  $27.79 \pm 5.21$  years.<sup>20</sup> A study by a university hospital reported the mean delivery age of those undergoing caesarean section to be  $29.4 \pm 6.51$  years.<sup>21</sup> In both studies, the mean age of women undergoing caesarean section was higher than that of those undergoing vaginal birth. The reason for this result

may be that the women with a higher socioeconomic and sociocultural stage are more involved in their occupations, therefore delaying their age of motherhood and choosing caesarean section as their option for birth. Delayed age at first delivery and the effort of reaching the desired number of children may be interpreted as the cause for the increase in the frequency of recurrent caesarean births.

Today, seeing women having children in the fourth decade of their lives because of social, economic and educational reasons in developed countries is not surprising. This condition increasingly occurs day by day as seen in the global population.<sup>22</sup> For this reason, studies have focused on pregnancies with advanced maternal age as a factor for increased caesarean rates. In a 10-year retrospective analysis by Rendtorff et al the caesarean section rate was found to be significantly elevated in women aged  $>45$  years old.<sup>23</sup> Moreover, the authors demonstrated that women with advanced age experienced an increased risk of preterm delivery (28% vs. 11%), preeclampsia, gestational diabetes and premature rupture of membranes. Similarly, in a comparison between 35- and 20-year-old parous women, Gareen and colleagues reported that the unadjusted risk ratio for caesarean section was 1.40 [95% confidence limit (CL)=1.18-1.65].<sup>24</sup> Contrary to these reports, Benli et al did not find any significant differences between pregnancies of advanced maternal-aged patients and low-risk patients in terms of preterm birth and delivery method.<sup>22</sup> In this study, we found a significantly higher rate of caesarean delivery in pregnant women aged less than 35 probably because of the relatively small number of pregnant women aged  $>35$  years included in the study.

A notable finding in this study is that no significant difference was found in birth weight between vaginal delivery and caesarean delivery cases. This result may be due to our correct timing for elective caesarean section births close to term. Birth weight had a significant effect on delivery type. Parrish et al.<sup>25</sup> reported that the primary caesarean rate ranged from 3.2% for multiparous teenage women who delivered infants weighing 3500-3999 g to 58.9% for primiparous women aged 40 or older who delivered infants weighing 4000 g or more. This finding supports the idea that an increase in mean foetal birth weight has a substantial role in the caesarean rate because foetal macrosomia is associated with increased risks for the mother, including emergency caesarean section.

In our centre, preterm birth below the 37th week was 11.7%, similar to the rate reported by Mathews and MacDorman in the United States in 2008.<sup>26</sup> The authors reported a 12.6% rate of deliveries before the 37<sup>th</sup> week.<sup>26</sup> In 2014, Hamilton et al reported a rate of 1%-9.5% throughout the United States. Note that preterm birth is still the most common cause of newborn mortality. Majority of the preterm births in our centre were between the 34<sup>th</sup> and the 36<sup>th</sup> weeks, which is defined as the late preterm period (77.9%). This rate is comparable with that

in the United States (71.45%).<sup>27</sup> Another point to emphasise is that 10.2% of the preterm births were multiple pregnancies. The multiple births observed in our clinics were found to be 2.3%. In an analysis conducted in the United States, this rate was reported to be 3.35% in 2014 and related to the advances in assisted reproductive techniques.<sup>27,28</sup> These data indicate that the management and the proper timing of birth in our clinics are comparable with those observed in the literature.

Our study has several limitations because of its retrospective nature of its design. First, patient data were abstracted from the patients' medical records. Thus, we were not able to confirm the absence of some crucial information and risk factors if they had not been recorded. Second, our hospital is a tertiary care teaching centre that provides the highest level of medical service. This condition affected the outcome of the delivery.

In conclusion, this study presented an overview of the caesarean section rate at the national level to establish a comparative basis for the investigation on country-specific determinants. In this context, the findings showed that the caesarean section delivery rate in Canakkale in 2012-2016 was 52.81%, which is higher than that recommended by the World Health Organization. We suggest that pregnant women and their carers who plan to undertake caesarean delivery should discuss its potential risks and benefits to make an informed decision. Moreover, caesarean section should only be performed when clear advantages are to be gained. A good protocol for caesarean delivery decisions should be mandatory for each clinic.

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