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Prevalence of Cesarean Section Based on Robson's Classification in Selected Delivery Centers of Shiraz University of Medical Sciences

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Abstract

Background: Cesarean section is performed to save the lives of the mother and the fetus. According to the World Health Organization (WHO), the expected cesarean section rate in different countries should be 10% - 15%, which is about 72.1% in Iran.
Objectives: Therefore, due to the high prevalence of cesarean section, the present study was conducted to determine the prevalence of cesarean section based on Robson's classification in selected hospitals of Shiraz University of Medical Sciences.
Methods: This descriptive-prospective study was conducted among 1787 women who had undergone a cesarean section in Hazrat Zeinab and Hafez hospitals of Shiraz in 2018. The data were collected by the researcher from the data recorded in the two delivery centers, and all the women were classified into 10 Robson groups. Cesarean section was calculated for each group of Robson's classification. Data were analyzed using descriptive statistics (frequency and percentage) in SPSS, version 22.
Results: Findings showed that 63.4% of the deliveries were performed through cesarean section, and the highest frequency (46.6%) was related to group 5, followed by group 2 (19.5%).
Conclusions: Given the high Prevalence of cesarean section observed in this study, it is recommended that the rate of cesarean section should be reduced in nulliparous women (group 2), and vaginal delivery should be increased after cesarean section (group 5).

Keywords: Cesarean Section, Classification, Delivery, Prevalence

1. Background

The birth of a baby occurs through a natural mechanism called delivery, which is an automatic process without the need for intervention (1-3). Fear, anxiety, pain, and mother's satisfaction from the previous experience of delivery play an important role in choosing the route of delivery (4, 5). Therefore, the impression of labor pain can affect the tendency and preference for the delivery route among pregnant mothers, and the increased negative perceptions regarding normal labor pain can significantly decrease the tendency toward vaginal delivery (6).

The proportion of cesarean section to the total birth rate is considered as one of the most important indicators in each country. Cesarean section is performed to save the lives of the mother and the fetus. However, today, excessive increase of cesarean section without any scientific indications has led to increased maternal and fetal morbidity and mortality (7).

In 1985, the World Health Organization (WHO) stated that the rate of cesarean section in each population should not exceed 15% (8). Cesarean section has increased worldwide from 6.7% in 1990 to 19.1% in 2014, indicating an increase of 12.4%. The rate of cesarean delivery in the developing countries has grown by 14.6% and in the developed countries by 12.7% (9). In 2012, with the growth rate of 30.3%, the United States and Australia had the highest rates of cesarean section among the developed countries. Cesarean section rate in some developing countries such as Chile (44%) Brazil, Korea, and China (46%) is alarming (10, 11).

The prevalence of cesarean section was 39.4% in northern Iran, while this rate ranged from 41.6% to 72.1% in different studies in other parts of Iran (12-17). At present, the heterogeneity in the classification of the cesarean section does not allow for valid comparisons due to the lack of clarity of the surgical indications and the relevant obstetric history. Classification of cesarean delivery should include all cesarean deliveries, have unique countermeasures, and

each cesarean section should be in the same category and be used regionally, nationally, and internationally (18).

Therefore, in 2001, Robson's classification was proposed by Robson (19), and it is the most appropriate means of measuring and comparing cesarean section to examine the reasons for changes in cesarean section trend in particular groups (20). The Robson's classification system divides women into 10 groups based on the five parameters of the parity, onset of labor, gestational age, fetal presentation, and number of fetuses (Appendix 1 in Supplementary File).

This classification, which shows the trend of cesarean section over time, was supported by the WHO in 2014 and Federation of International of Gynecology and Obstetrics in 2016 for ease of use and flexibility (21-23). Robson's classification is used to analyze the delivery process and effective factors in cesarean section in health care facilities of state, national and international bases in developing and developed countries (24-29).

2. Objectives

We intended to evaluate and compare the differences in cesarean rates using the Robson's classification. Therefore, the aim of this study was to determine the prevalence of cesarean section based on Robson's classification in Shiraz City in 2018.

3. Methods

3.1. Study Design

This descriptive-prospective study was carried out among all women who had undergone a cesarean section in Hazrat Zeinab and Hafez hospitals of Shiraz in 2018. The reason for choosing this environment was easy access to the study subjects and the availability of conditions to achieve the desired goals. The number of cesarean section cases during three months (i.e., September, October and November) was selected as the sample size. Also, census sampling was used in this study.

The inclusion criterion was women who had undergone a cesarean section, and the exclusion criterion was incomplete records. To determine the prevalence of cesarean section, we studied the hospital records and available data of all women who had undergone a cesarean section (1787 women) over three months. The researcher, after obtaining permission from the aforementioned hospitals, extracted the existing documents of cesarean section deliveries and entered the information in the table (Appendix 1 in Supplementary File).

3.2. Robeson's Caesarian Parameters

The Robeson's cesarean parameters contain information on the delivery of research units, including: (1) parity (nulliparous and multiparous with and without previous cesarean section); (2) the onset of labor (spontaneous onset of labor, induced labor or cesarean section before labor. Spontaneous onset of labor: women with a cervix dilatation of at least 4 centimeters enter the labor. Induced labor: the use of any pharmacological agents [prostaglandin and oxytocin] or mechanical agents [foley balloon] in women with dilatation of less than 4 cm is called labor induction. Cesarean section before labor: all women who had experienced cesarean section and had neither entered labor nor sustained labor induction) (30), (3) gestational age (preterm or term); (4) fetal presentation (cephalic, breech or transverse/oblique); and (5) the number of fetuses (singleton and multiple births). According to the above information, each research sample was entered into the Robson's classification. Then, the total number of cesarean sections was calculated by the statistics of the total number of cesarean deliveries in these centers, and the share of each group was determined in the total amount of cesarean sections.

3.3. Statistical Analysis

Data were analyzed using descriptive statistics (i.e., frequency, mean and standard deviation) in SPSS, version 22.

3.4. Ethical Considerations

Ethics committee approval was obtained from the Research Ethics Committee of Shiraz University of Medical Sciences. Permission to conduct the research was given by the authorities of the related units, and the full explanation of the objectives of the study was provided to the authorities. The authorities were assured that all the research information was kept confidential.

4. Results

Among the 2,819 women who delivered in the target hospitals, 1032 (36.6%) women had a vaginal delivery, and 1787 (63.4%) had a cesarean delivery. Among the 1787 cases of cesarean delivery, 455 (25.5%) women had scheduled a cesarean section, and 1332 (74.5%) women had emergency cesarean section.

Of the 2819 individuals who had delivery in Shiraz hospitals, 1,686 women were referred to Hazrat Zeinab Hospital and 1133 women were referred to Hafez Hospital. In general, 60.3% of the women in Hazrat Zeinab Hospital and 68.05% in Hafez Hospital had cesarean section (Table 1).

Table 1. Frequency Distribution of Delivery Mode in the Study Population[a]

Name of Hospital	Mode of Delivery	Values	Total
Hazrat Zeinab	NV	670 (39.7)	1686
	CS	1016 (60.3)	
	Prelabor CS	268 (26.4)	1016
	Emergency CS	748 (73.6)	
Hafez	NV	362 (31.95)	1113
	CS	771 (68.05)	
	Prelabor CS	187 (24.3)	771
	Emergency CS	584 (75.7)	

Abbreviations: Cs, cesarean section; NV, natural vaginal.
[a]Values are expressed as No. (%).

The mean age of the women with cesarean section was 26.4 $\pm$ 5.7 years. The highest rate of cesarean section occurred at the age group of 25 - 29 years with the educational degree of diploma (Table 2).

Table 2. Demographic Characteristics of the Study Population[a]

Variable	Values
Maternal age	
< 20	173 (9.7)
20 - 24	423 (23.7)
25 - 29	824 (46.1)
$\geq$ 30	367 (20.5)
Total	1878 (100)
Education	
< Diploma	688 (38.5)
Diploma	874 (48.9)
> Diploma	225 (12.6)
Total	1878 (100)

[a]Values are expressed as No. (%).

The majority of the women with cesarean section were multiparous with cesarean section (58.6%) and had spontaneous labor (50.1%), term pregnancy (84.7%), cephalic presentation (90.7%), and singleton pregnancies (95.2%) (Table 3). The highest rate of cesarean section was in groups 5 (46.6%) and 2 (19.5%), respectively (Table 4).

Table 3. Frequency Distribution of the Prevalence of Cesarean Delivery Based on Robson's Classification[a]

Variables of Robson's Classification	Values
Parity	
Nulliparous	541 (30.3)
Multiparous (excluding previous CS)	199 (11.1)
Multiparous with Previous CS	1047 (58.6)
Total	1787 (100)
Onset of labor	
Spontaneous	896 (50.1)
Induce	436 (24.4)
Cesarean section before labor	455 (25.5)
Total	1787 (100)
Gestational age at delivery	
Term	1513 (84.7)
Preterm	274 (15.3)
Total	1787 (100)
Fetal presentation	
Cephalic	1620 (90.7)
Breech	161 (9)
Oblique/transverse	6 (0.3)
Total	1787 (100)
Number of fetus	
Singleton	1701 (95.2)
Multiple	86 (4.8)
Total	1787 (100)

[a]Values are expressed as No. (%).

5. Discussion

Results of this study showed that out of the 2819 deliveries in hospitals, 63.4% of deliveries were performed through cesarean section. According to a study by Zgheib et al. (31) in Lebanon, the overall rate of cesarean section was reported 49%, where the increase in cesarean section and decrease in vaginal delivery after cesarean section were associated with an increase in cesarean section. One study by Dhakal et al. (32) in Nepal (2016 - 2017) showed that the prevalence of cesarean section was 18.8%. The results of a review study by Rafiei et al. (33) in Iran during 1999 - 2016 showed that the total number of deliveries was 197514; of them, 94807 (48%) deliveries were cesarean section.

High education level, employed mothers, and older age of mothers were the most important factors in the high Prevalence of cesarean section (33). According to the results of Badiee Aval et al.'s study (34), the overall rate of cesarean section in Khorasan Razavi in 2011 was 52%. The number of cesarean sections in non-university hospitals was significantly higher than in university hospitals. Closer supervision in academic hospitals by faculty mem-

Table 4. Frequency Distribution of Cesarean Delivery Based on Robson's Classification[a]

Number	Groups	Values
1	Nulliparous, singleton, cephalic, ≥ 37 weeks' gestation, in spontaneous labor	38 (2.1)
2	Nulliparous, singleton, cephalic, ≥ 37 weeks' gestation, induced labor or cesarean section before labor	348 (19.5)
3	Multiparous (excluding previous cesarean section), singleton, cephalic, ≥ 37 weeks' gestation, in spontaneous labor	30 (1.7)
4	Multiparous without a previous uterine scar, with singleton, cephalic pregnancy, ≥ 37 weeks' gestation, induced or cesarean section before labor	115 (6.4)
5	Previous cesarean section, singleton, cephalic, ≥ 37 weeks' gestation	833 (46.6)
6	All nulliparous with a single breech	55 (3.1)
7	All multiparous with a single breech (including previous cesarean section)	35 (2)
8	All multiple pregnancies (including previous cesarean section)	84 (4.7)
9	All women with a single pregnancy in transverse or oblique lie (including those with previous cesarean section)	6 (0.3)
10	All singleton, cephalic, < 37 weeks' gestation pregnancies (including previous cesarean section)	243 (13.6)
	Total	1787 (100)

[a]Values are expressed as No. (%).

bers and performing cesarean section based on scientific indications can be an important reason for the prevention of cesarean section without indication in these centers (34).

In the present study, the rate of cesarean section n was found to increase due to the high percentage of women with a previous cesarean section. According to the statistics, it can be stated that the prevalence of cesarean section in Shiraz is increa sing and is higher than the acceptable standard proposed by the WHO (10% - 15%). In Shiraz, the frequency of cesarean section is rising every day, as it has increased by 4.8% from 2015 (58.6%) to 2018 (63.4%).

Also, in the present study, most cases of cesarean section were in groups 5 (46.6%) and 2 (19.5%). Lafitte et al.'s (35) study performed in France (2014) showed the highest number of cesarean sections in group 5 (32.1%) and group 2 (16.7%). The increase in the cesarean section in group 5 was due to the mothers' request and doctors' fear of uterine rupture.

According to the results of Manny-Zitle et al.'s study (2014 - 2016), groups 5 (21.24%) and 2 (13.88%) had the highest percentage of cesarean section (36). The study of Roberge et al. (37) in Quebec (2008 - 2011) showed that the highest percentage of cesarean section was in groups 5 (35%) and 2 (17.7%). In this study, 78% of women with previous cesarean section had an elective cesarean section, and consequently, cesarean section increased in group 5 (37). Results of Lafitte, Manny-Zitle et al. (36) and Roberge's studies (37) were consistent with those of our study. The study of Nakamura-Pereira et al. (30) in Brazil (2011 - 2012) showed that the most effective groups in the total cesarean section were groups 2 (33.6%) and 5 (30.8%). Their results are contradictory to the findings of the present study, where the highest rate of cesarean section was in group 2 because it had the highest sample size (30).

The study of Zimmo et al. (38) in Palestine (2016 - 2017) showed that the highest percentage of cesarean section was in the groups 5 (42.6%) and 8 (11.6%). The result regarding group 5 is in agreement with the present results. Since many women had more than three cesarean sections in the study by Zimmo et al., the rate of cesarean section in group 5 was the highest.

Due to the high percentage of cesarean delivery and the large share of each of these groups (5 and 2) in the rate of cesarean section, these two groups are determined as the priority for the following purposes: (1) breaking the motto of "one cesarean section is equal to always cesarean section" and (2) prevention of primary cesarean section (during labor or before labor) (39).

Considering the fact that in the present study, the Prevalence of cesarean section in group 5 was the highest, it is common to recommend repeated caesareans to women with more than one previous cesarean section (20) though vaginal delivery after cesarean section has been supported as a safe option (40). However, the number of women with vaginal delivery after cesarean section has declined in recent years because of the fear of rupture of the uterus (41, 42). Some centers have been dedicated to vaginal delivery clinics after cesarean section to help women choose consciously, to assist in decision-making, and increase the number of women who choose vaginal delivery after cesarean section (43, 44).

Group 2 was the second group with the highest rate of cesarean section. The reason for the increase in cesarean section in this group was labor induction. The number of women with labor induction was increasing (19), and decrease in the rate of cesarean section in this group would affect the incidence of cesarean section in the whole group of women with vaginal delivery and diminish the number of women in group 5 in the coming years (45).

Midwifery units should consider two important issues related to labor induction:

1) The first issue is that we need evidence of labor induction (46, 47). Limiting labor induction to those who have no clear indication has a significant effect on the incidence of cesarean section, and labor induction should not

be practiced routinely.

2) The second issue is that common obstetric interventions such as labor induction and the use of oxytocin may alter the normal development of labor (20). A study on singleton, cephalic, term pregnancies with spontaneous labor showed that active labor with dilation of 0 - 1.5 cm/h begins only after 6 cm dilatation and many women may spend a lot of time to achieve 6 cm dilatation (48). Many women may also have cesarean section due to lack of progression of labor when they do not go to the active phase of labor (49).

Given that one of the main reasons for cesarean section is repeated cesarean section, most women who have their first delivery in the form of cesarean section also receive cesarean section during subsequent deliveries. Accordingly, the cause of performing cesarean section for the first time should be assessed more carefully. Any mistake in this case causes the person to be forced to undergo subsequent cesarean sections; thus, it increases the incidence of repeated cesarean sections in the future. Labor induction can also be arranged with protocols and guidelines for labor management. Due to the high Prevalence of cesarean section in various studies, it is recommended that strategies such as holding training sessions on the benefits of vaginal delivery and reducing the stress of pregnant women should be implemented. By the plan midwives' attendance during childbirth and planned delivery, the stress of women and people around them can be reduced. Thus, it is important for health care providers to understand the short- and long-term benefits of cesarean delivery and vaginal delivery, and provide appropriate opportunities for preventing excessive use of cesarean delivery, in particular, the first cesarean delivery (50).

Strengths and weaknesses of the study:

One of the strengths of the study is that it is the first study in Iran that examined the prevalence of cesarean delivery based on Robson's classification.

5.1. Limitations of the Study

The limitations of the present study included a lack of complete accuracy of the hospital records, which did not allow for the evaluation of much of the information.

Considering the findings of this study and other studies, some suggestions are made to reduce the rate of cesarean section; we hope that the authorities will take sufficient steps towards the implementation of these suggestions.

We recommend providing the necessary facilities and opportunities for mothers who have undergone a cesarean section once to initiate spontaneous labor. Natural delivery after cesarean section in the absence of a definitive indication for cesarean section is suggested. Also, it is recommended to explore the influence of health care personnel on the choice of delivery route.

To promote physiological delivery, we recommend timely admission of mothers (no hospital admission for mothers before 40 completed weeks of pregnancy and no admission in the latent phase without indication) and not performing labor induction as a routine practice.

5.2. Conclusions

Based on Robson's classification, cesarean section in groups 5 and 2 had the highest rate. Therefore, it is imperative that the medical team highlight the short- and long-term effects of cesarean section and vaginal delivery in prenatal visits. Besides, appropriate opportunities should be provided to prevent the overuse of cesarean section, especially early cesarean section.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

Authors' Contribution: MA and ZR prepared the first draft of the manuscript. MA made critical revisions to the paper and responded the reviewers. MZ helped in the data analysis.

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