

## A survey on causes of cesarean sections performed at the university hospitals of Niknafs and Ali-Ibn Abi Talib of Rafsanjan, Iran, in the second trimester of 2014

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### Abstract

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**Background:** The increase in the prevalence of cesarean section (C-section) in recent decades has become a public health problem worldwide. Studies of cesarean section in order to identify the causes and form policies and interventions to reduce the incidence of this health problem are necessary. This study was conducted with the aim to investigate the causes of C-sections performed at Niknafs and Ali-Ibn Abi Talib Hospitals in Rafsanjan, Iran, in the second trimester of 2014.

**Materials and Methods:** In this cross-sectional study, 560 pregnant women were selected from among those referred to Niknafs and Ali-Ibn Abi Talib Hospitals in the second trimester of 2014 for cesarean delivery. Information was collected using a researcher-made checklist through interviews with patients and reviewing medical records. Data were analyzed using *chi-square* or *Fisher's* exact tests, as required.

**Results:** The mean and standard deviation of age of women was  $29.46 \pm 5.08$  years and most of them (65.0%) were in the age range of 26-36 years and had a diploma (40.7%). Considering delivery history, the highest percentage of women had had a single delivery (38.9%) and over half of the subjects (52.9%) had experienced a previous C-section. The most common causes were repeated C-section (52.9%), elective C-section (on maternal request) (7.5%), meconial stained (6.1%), fetal distress (5.0%), and breech presentation (4.5%). Statistically significant associations were observed between C-section reasons, and age ( $P < 0.001$ ), number of previous pregnancies ( $P < 0.001$ ), and previous delivery method ( $P = 0.010$ ).

**Conclusions:** Repeated C-section, as the most common cause of cesarean, has had a major role in increasing cesarean. Vaginal delivery after cesarean, taking into account the clinical and legal circumstances and providing training programs to acquaint women to the negative consequences of C-section and vaginal delivery benefits would be effective in the choice of delivery and might help in reducing cesarean.

**Keywords:** Cesarean Section, Delivery, Pregnancies, Iran.

### Introduction

Cesarean section (C-sections) is one of the most common surgeries around the world and its prevalence has increased over the past few decades. It has become a public health concern in developed and developing countries (1-3). C-section refers to removing the fetus, placenta, and membranes by cutting the abdominal wall and uterus (4). It is classified

into elective, necessary, and emergency C-section. Planned or elective C-section is based on the maternal request without medical reasons, according to the signs of labor, and is performed within the allotted time. Necessary

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C-section is performed after the onset of labor pains, when there is a lack of progress in labor by the assumption of the risk of damage to the fetus without any immediate threat. Emergency C-section is performed at the time of any immediate threat to the health of the mother or the fetus (5).

The incidence of C-section in the United States of America is one-third of all births and this surgery is the most common major surgery in this country with 1.3 million cases (6). In 1985, the World Health Organization (WHO) announced the maximum acceptable rate of C-section in each geographical area as 10%-15% (7). According to this organization, in 2010 about 25.7% of the total childbirths worldwide were C-sections (8). In a study conducted in 137 countries worldwide, the prevalence of C-sections in 54 countries was reported less than 10% and in 69 countries more than 15% (9). The incidence of C-section in Iran, based on a meta-analysis, was reported 48% among 74,809 cases (10). The rate of C-section in different countries varies between urban and rural areas, different socio-economic groups, and among people with different rate of access to different public and private services (11).

The main objective of C-section is reducing the incidence of maternal and neonatal mortality during childbirth in dangerous situations (12). Indications for C-section include breech presentation, previous C-section, multiple pregnancy, lack of progress in labor, fetal distress, small fetus and macrosomia, cord prolapse, transverse or oblique location of the fetus, head and pelvis mismatch, placenta previa, abruptio placentae, and severe preeclampsia (13).

In case of emergency, C-sections can have lifesaving effects, but in unnecessary cases, it can have adverse consequences for the mother and the baby. Pelvic infection, endometritis, post-operative infections, urinary tract infections, thrombophlebitis, bleeding requiring transfusion, injury to the uterus, bladder, and ureter, second laparotomy, risk of resuscitation and mortality, immediate effects and thromboembolic disease, readmission,

adhesions after surgery, and hernia tear during surgery are the delayed complications of C-section. Moreover, in the next pregnancy, C-section can cause abnormal formation of placenta and placenta adhesion at the scar, wound dehiscence and rupture of the uterus, C-section hysterectomy, infertility, ectopic pregnancy, growth restriction and preterm birth, stillbirth, and repeated C-section (14).

Based on evidence, C-section could have negative effects on health in the neonatal period, childhood, and even adulthood. C-section is associated with heart disease (overweight and obesity, type 1 diabetes), autoimmune and inflammatory disorders (allergic rhinitis, food allergies, and atopy, asthma, celiac disease, and inflammatory bowel disease), and autism. The risk of some of these disorders, such as celiac disease, Crohn's disease, and autism, is higher in elective C-sections than emergency C-sections (15, 16).

The growing number of C-sections in different areas can be caused by factors including increased elective C-section, repetitive C-section, mother and doctor's willingness, due to fear and risk reduction, increased unnecessary interventions in the process of childbirth, development of modern technology, and an increase in the ability to predict the risk of pregnancy (17). Factors such as previous negative experience of natural childbirth, fear of possible complications such as rupture, uterine prolapse, urinary and fecal incontinence, sexual dysfunction, harming the baby during natural delivery, and anxiety and depression of mothers are the reasons for elective C-section in women (18). Determinants of C-section are very complex and, in addition to clinical symptoms, it is also dependent on the economic, organizational, and socio-cultural status of women (19).

High incidence of C-section in Iran and its negative consequences in unnecessary cases indicated the importance of further studies on this health problem. Investigating the causes of C-section in order to identify the common unnecessary causes and form policies and

interventions to reduce its prevalence is necessary. Therefore, this study was conducted with the aim to investigate the causes of C-sections performed in Niknafs and Ali-Ibn Abi Talib Hospitals in Rafsanjan, Iran, in the second trimester of 2014.

### Materials and Methods

This was a cross-sectional study. The study population consisted of all pregnant women (921 cases) who referred to Niknafs Maternity Hospital for a C-section and the gynecology ward of Ali-Ibn Abi Talib Hospital from 22 of June until 22 of September 2014. According to statistical reports of the Department of Health (data from Niknafs and Ali-Ibn Abi Talib Hospitals) in the second quarter of 2014, 1751 births were conducted in the city of Rafsanjan. Among these cases, 921 cases were C-sections (52.6%) and 830 (47.4%) were natural deliveries.

To determine the sample size of the C-section cases, the following equation was used:

$$n = \frac{Z^2 \times \frac{1-\alpha}{2} \times P \times (1 - P)}{d^2}$$

Considering the significant level of  $\alpha = 0.05$  and  $d = 0.04$ , and based on the study by Aminzadeh conducted at Niknafs Maternity Hospital in Rafsanjan in 2000 (20),  $P = 36.7\%$  (frequency of previous C-sections as the reason for the mothers next C-section), the number of samples was estimated as 560 people.

The data gathering tool consisted of a two-part researcher-made checklist. The checklist included demographic information such as age, education, number of previous pregnancies, previous delivery with tools, and history of C-section, and the second part included C-section reasons such as maternal and fetal factors. This checklist was prepared on the basis of references and resources, and was reviewed by three gynecology faculty members and necessary amendments were applied and approved. The checklist was

completed by a midwife. She visited Niknafs Maternity Hospital and obstetrics and gynecology wards of Ali-Ibn Abi Talib Hospital every day, and completed the checklist using patient's records and through interviews.

The collected data were analyzed using SPSS software (version 15, SPSS Inc., Chicago, IL, USA). Quantitative data were reported as mean  $\pm$  SD (standard deviation), and qualitative data were reported as number (percentage). In order to examine the association between demographic variables and C-section reasons, *chi-square* test or *Fisher's* exact test was used. The level of significance was set at 0.05.

### Results

The mean and standard deviation of age of the participants was  $29.46 \pm 5.08$  years, and their minimum age was 16 years and maximum age was 45 years. Demographic characteristics of the subjects are shown in table 1. Most women were in the age group of 25-36 years with diploma as their education level. Regarding the history of childbirth, women with one previous delivery had the most frequency and more than half of them had previous C-section. Distribution of reasons for C-section and associated 95% confidence intervals are presented in table 2. The most common reasons of C-section were maternal factors. Among maternal factors, repetitive C-section, with a frequency of half of all cases, was the most common factor and elective C-section was the second most common. Meconium-stained amniotic fluid, fetal distress, and breech presentation were the most common factors of C-section, respectively.

The reasons for C-section revealed no statistically significant association with age ( $P < 0.001$ ), number of previous pregnancies ( $P < 0.001$ ), and previous delivery method ( $P = 0.010$ ). As age increased, repeated C-section also increased (as the reason for C-section), while other reasons decreased.

**Table 1: Frequency distribution of demographic variables in studied women (n=560)**

| Demographic  | N   | %    |
|--|-----|------|
| <b>Age</b>   |     |      |
| 15-25  | 126 | 22.5 |
| 26-35  | 364 | 65   |
| >35  | 70  | 12.5 |
| <b>Level of Education</b>                          |     |      |
| Illiterate   | 12  | 2.1  |
| Primary educated                                   | 162 | 28.9 |
| Diploma  | 228 | 40.7 |
| Over diploma                                       | 25  | 4.5  |
| Bachelor's degree                                  | 126 | 22.5 |
| Master of science                                  | 6   | 1.1  |
| Physician  | 1   | 0.2  |
| <b>previous pregnancies</b>                        |     |      |
| 0  | 198 | 35.4 |
| 1  | 218 | 38.9 |
| 2  | 107 | 19.1 |
| + 3  | 37  | 6.6  |
| <b>a previous delivery methods to using tools,</b> |     |      |
| Forceps  | 1   | 0.2  |
| Vacuum   | 7   | 1.3  |
| <b>History of previous cesarean</b>                |     |      |
| 0  | 264 | 47.1 |
| 1  | 206 | 36.8 |
| + 2  | 90  | 16.1 |

By increase in the number of previous pregnancies, maternal and fetal factors decreased. However, mothers with more than two previous pregnancies showed increase in fetal and maternal factors. Moreover, in

previous delivery methods without tools compared to using tools, repetitive C-section delivery and fetal factors increased, while other reasons showed a decrease (Table 3).

**Table 2: Frequency distribution of cesarean sections causes and associated 95% confidence intervals in studied women (n=560)**

| causes of cesarean                       | N   | %    | 95% Confidence interval |
|--|-----|------|-------------------------|
| <b>maternal factors</b>                  |     |      |                         |
| Repeated C-section*                      | 296 | 52.9 | 48.7-57.0               |
| Elective C-section (on maternal request) | 42  | 7.5  | 5.3-9.7                 |
| Lack of labor progress                   | 23  | 4.1  | 2.5-5.8                 |
| Lack of response to induction of labor   | 11  | 2.0  | 0.8-3.1                 |
| Medical and surgical causes**            | 5   | 0.9  | 0.1-1.7                 |
| Other medical causes***                  | 31  | 5.5  | 3.6-7.4                 |
| Cephalopelvic Disproportion (CPD)        | 9   | 1.6  | 0.6-2.6                 |
| <b>fetal factors</b>                     |     |      |                         |
| Meconial stained                         | 34  | 6.1  | 4.1-8.0                 |
| fetal distress                           | 28  | 5.0  | 3.2-6.8                 |
| Breech presentation                      | 25  | 4.5  | 2.8-6.2                 |
| Transverse lie                           | 2   | 0.4  | -0.1-1.1                |
| Being twin                               | 7   | 1.3  | 0.3-2.2                 |
| Placenta previa                          | 1   | 0.2  | -0.2-0.5                |
| Placental abruption                      | 3   | 0.5  | -0.1-1.1                |
| Large-sized embryo                       | 4   | 0.7  | 0-1.4                   |
| Decreased amniotic fluid                 | 6   | 1.1  | 0.2-1.9                 |
| More than one reason****                 | 33  | 5.9  | 3.9-7.8                 |

\*C-section; cesarean section. \*\* Uterine surgery except for cesarean section, preeclampsia.

\*\*\* Infertility, herniated disc, vaginal infections, herpes, eye disease, hip fracture, hemorrhoid, kidney stones, Colporrhaphy, severe varicose veins. \*\*\*\* Fetal head and pelvis mismatch, decreased amniotic fluid, preeclampsia and preterm delivery, Oligohydramnios and diabetes, preeclampsia, and etc.

**Table 3:** Association of demographic characteristics and cesarean section causes in studied women (n=560)

| Variable                            | Cesarean section causes    | maternal factors  |      |                   |      |                        |      | fetal factors |      | P-value* |
|-------------------------------------|----------------------------|-------------------|------|-------------------|------|------------------------|------|---------------|------|----------|
|                                     |                            | repeated cesarean |      | elective cesarean |      | Other maternal factors |      | N             | %    |          |
|                                     |                            | N                 | %    | N                 | %    | N                      | %    |               |      |          |
| <b>Age</b>                          |                            |                   |      |                   |      |                        |      |               |      |          |
|                                     | 15-25                      | 33                | 26.2 | 19                | 15.1 | 27                     | 21.4 | 47            | 37.3 | < 0.001  |
|                                     | 26-35                      | 219               | 60.2 | 23                | 6.3  | 67                     | 18.4 | 55            | 15.1 |          |
|                                     | + 36                       | 44                | 62.9 | 0                 | 0    | 12                     | 17.1 | 14            | 20.0 |          |
| <b>Level of Education</b>           |                            |                   |      |                   |      |                        |      |               |      |          |
|                                     | Under diploma              | 101               | 58.0 | 5                 | 2.9  | 34                     | 19.5 | 34            | 19.5 | 0.141    |
|                                     | Diploma                    | 119               | 52.2 | 19                | 8.3  | 44                     | 19.3 | 46            | 20.2 |          |
|                                     | Over diploma               | 14                | 56.0 | 4                 | 16.0 | 4                      | 16.0 | 3             | 12.0 |          |
|                                     | Bachelor's degree and over | 62                | 46.6 | 14                | 10.5 | 24                     | 18.0 | 33            | 24.8 |          |
| <b>previous pregnancies</b>         |                            |                   |      |                   |      |                        |      |               |      |          |
|                                     | 0                          | 0                 | 0    | 37                | 18.7 | 76                     | 38.4 | 85            | 42.9 | < 0.001  |
|                                     | 1                          | 181               | 83.0 | 2                 | 0.9  | 18                     | 8.3  | 17            | 7.8  |          |
|                                     | 2                          | 91                | 85.0 | 2                 | 1.9  | 7                      | 6.5  | 7             | 6.5  |          |
|                                     | > 2                        | 24                | 64.9 | 1                 | 2.7  | 5                      | 13.5 | 7             | 18.9 |          |
| <b>a previous delivery methods</b>  |                            |                   |      |                   |      |                        |      |               |      |          |
|                                     | Using tools                | 2                 | 25.0 | 1                 | 12.5 | 5                      | 62.5 | 0             | 0    | 0.010    |
|                                     | No tools                   | 294               | 53.3 | 41                | 7.4  | 101                    | 18.3 | 116           | 21.0 |          |
| <b>History of previous cesarean</b> |                            |                   |      |                   |      |                        |      |               |      |          |
|                                     | No                         | 0                 | 0    | 42                | 15.9 | 106                    | 40.2 | 116           | 43.9 | ---      |
|                                     | Yes                        | 296               | 100  | 0                 | 0    | 0                      | 0    | 0             | 0    |          |
| <b>Number a previous cesarean</b>   |                            |                   |      |                   |      |                        |      |               |      |          |
|                                     | 0                          | 0                 | 0    | 42                | 15.9 | 106                    | 40.2 | 116           | 43.9 | ---      |
|                                     | 1                          | 206               | 100  | 0                 | 0    | 0                      | 0    | 0             | 0    |          |
|                                     | > 1                        | 90                | 100  | 0                 | 0    | 0                      | 0    | 0             | 0    |          |

\* Chi-square test or Fisher's exact test (Undetermined values were due to unreliability of the test results and P < 0.050 was considered statistically significant)

### Discussion

According to statistical reports provided by Niknafs Maternity Hospital and Ali-Ibn Abi Talib Hospital in the second quarter of 2014, the incidence of C-section was 52.6%. The prevalence of C-section in different cities of Iran was reported as 66.4% in Shiraz (21), 59% in Bam (22), 40.3% in Birjand (23), 43% in Zanjan (24), and 44.5% in Yazd (25). The evaluation of the course of C-section in three decades from 1979 to 2009 in Tehran, Iran, showed that the prevalence of C-sections has increased. Repetitive C-section was the most common reason during the last 30 years (26). The present study results on the causes of C-sections showed that the majority of C-sections (52.9%) were repetitive C-section. This finding was similar to that of most of the studies in Iran (21-26). Repeated C-section was the most common indication of primary deliveries in 28% of births in England and 32.8% of births in America (27).

Repetitive elective C-section is one of the main causes of increase in C-sections associated with fetal distress, dystocia (difficult birth), and breech presentation (28). Vaginal birth after C-section was one of the practical solutions introduced in the 1990s by the American College of Obstetricians and Gynecologists (ACOG) in order to reduce maternal and fetal complications of repeated C-section (29). Vaginal birth after C-section is usually a safe method compared to repeated C-section, especially in women with a high probability of a future pregnancy (30). Most women with a history of C-section are able to have a vaginal delivery; therefore, 75 out of 100 women will have successful vaginal deliveries and 25 out of 100 will require repetitive C-sections (31). A meta-analysis reported the success rate of vaginal birth after one C-section as 76.5% and after two C-sections as 71.1% (28). Based on available evidence, vaginal birth is a suitable option for

many women with a history of C-section with low transverse incision which also has different benefits and risks for the mother and the fetus (32). Uterine rupture during vaginal delivery is a rare complication after cesarean delivery, and based on evidence, its incidence is less than 1% (33). Fear of uterine rupture is one of the most common causes of anxiety and obstetricians' and gynecologists' avoidance of this type of delivery. Overall, vaginal birth after C-section has an important role in reducing the incidence of C-section and its complications. It is recommended that all specialists of this method of delivery consider all clinical and legal conditions to prevent maternal and fetal complications (29).

In this study, elective C-section was reported as the second cause of C-section after repeated C-section. C-section demanded by the mother indicates any planned cesarean delivery in the absence of medical indications and maternal and fetal obstetrics (34). In the United States of America, 2.5% of all deliveries are performed at the request of the mothers (35). Moreover, 4% of Norwegian nulliparous women and 7.3% of multiparous Norwegian women expressed that in the case of being able to choose their delivery method, they would select cesarean delivery. In the United Kingdom, 10% of midwives, 21% of obstetricians, 50% of urogynecologists, and 50% of colorectal surgeons preferred elective C-section (36). In a study in East Azerbaijan, Iran, on cesarean delivery, preferential delivery was 62.2% of obstetricians and gynecologists and 57.5% of midwives preferred it in first pregnancy for themselves, and it was recommended delivery by 33.7% of obstetricians and 17.6% of the midwives to pregnant women without any indication (37).

The results showed that elective C-section was significantly higher in nulliparous women. The high prevalence of repetitive cesarean delivery in nulliparous women plays an important role in increasing the rate of cesarean delivery in the next pregnancy. Factors such as fear of labor pain, bitter and traumatic experience in the previous delivery in multiparous women,

the desire to determine the time of delivery and having a predictable and non-emergency situation, concerns about the emergence of complications for the fetus and the baby during labor pains, pelvic prolapse, and concerns regarding the perineum and obesity were the reasons for mothers' selection of C-section (34).

Policies such as raising awareness among women about the risks and effects of elective C-section and delivery room management system promotion can be helpful in preventing elective deliveries. The results showed that the training of husbands to raising awareness and attitude of women was effective in reducing elective C-sections. In another study, the training of pregnant women and medical staff reduced elective C-section by up to 54% (38). Meconium stain after repetitive C-section and elective C-section was the third reason for cesarean deliveries and this finding was consistent with a study conducted in Zanjan (39). In another study in Nepal, meconium stain was reported as the most common cause of C-section (40).

One of the programs of the health care system is to promote natural childbirth and reduce C-sections. This plan is conducted through policies such as encouraging vaginal delivery through promoting painless delivery, free labor costs in public hospitals for natural deliveries, reconstruction of delivery departments with specific spaces for deliveries, making natural births pleasant. Although the implementation of policies, such as improving natural delivery conditions and eliminating costs, can promote natural childbirth in some segments of society, it seems that applying such policies alone cannot significantly influence the reduction of C-section in the country. Selection of the method of delivery by the doctor and the pregnant women is influenced by many factors, including factors related to labor conditions, the health care system, culture of the society, and cesarean and vaginal delivery consequences (41).

The limitation of this study included the concurrence of the implementation of

healthcare reform with this research. Thus, the applying of this plan, free natural childbirth and lack of insurance coverage for the costs of C-sections, could cause an overall reduction in the rate of C-sections. On the other hand, gynecologists were aware of the plan and this may have influenced their choice of delivery method.

### Conclusion

The results of this study showed the high prevalence of C-sections in the city of Rafsanjan. Vaginal birth after C-section, taking into account the individual's clinical condition, the legal requirements, providing the necessary advice, and preparing the pregnant women for this type of delivery can have an important role in decreasing the incidence of C-section. Repetitive C-section, as the most common reason for C-section, had a major role in the increasing of of this type of childbirth. After repeated C-section, elective C-section, meconium excretion, and fetal distress were the most common reasons for C-section, respectively.

C-section is not the preferred method for delivery, because like any other surgery it causes many complications for the mother and the baby. Attempts to reduce the percentage of elective C-section are important. Therefore, managers and planners should develop and implement appropriate strategies to reduce this method of delivery. Thus far, steps, such as training and counseling of women before pregnancy and during pregnancy, painless delivery, labor preparation classes, C-section cultural change and elimination of misunderstandings, raising awareness about birth methods and their side effects and risks, and improving facilities and safe equipment for vaginal delivery have been taken. Nevertheless, further effective measures and more effort is necessary in this respect.

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