

ORIGINAL ARTICLE

Relationship between Adequacy of Prenatal Care and Cesarean Section: a Case Control Study

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ABSTRACT

Due to the progressive increase in the number of cesarean section, it is necessary to study the factors affecting the rate of cesarean sections. Objectives: In this paper we aimed to evaluate between the adequacy of prenatal cares and cesarean section. A case-control study was conducted in Shahroud, Iran, 20013. The target population was 400 women who were delivered in the Fatemeh hospital. The study population consisted of two groups. The case group (n = 200) was women who had been cesarean section. The control group (n = 200) was including age-matched women who had vaginal delivery. The adequacy of prenatal care was leveled according to Adequacy of prenatal care utilization (APNCU). Analyses revealed that the case group received more adequate (OR =1.59, 95% CI 1.06 -2.49) and the case group received more prenatal care in Non-government services (OR =3.53, 95% CI 1.56 -6.70). According to Adequacy of prenatal care utilization (APNCU, 22% of antenatal care in the case group were in the other levels, with no differences between groups. There is a relationship between prenatal care and cesarean section. Also there is a relationship between prenatal care in Non-governmental services and cesarean section. Despite the association found in the study, we cannot conclude that cesarean section would be prevented only by an inadequate prenatal care, as cesarean section is associated with factors of complex and multi factorial etiology. The results could be used to plan monitoring measures and evaluate programs of health care assistance during pregnancy, at delivery, focusing on reduced cesarean sections rates.

Keywords; Relationship, Prenatal Cares, Cesarean section, Adequacy, Index

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BACKGROUND

Cesarean section is defined as the delivery of the fetus via laparotomy and hysterotomy [1]. Cesarean section has an important role in reducing maternal and peripartum mortality rate. The primary goal was maternal life saving in limited deliveries, but its indications were expanded during recent years and now it covers a range of more severe dangers for both mother and fetus [2].

Approximately 18.5 million cesarean sections are performed yearly worldwide. About 40% of the countries have CS rates <10%, about 10% have CS rates between 10 and 15%, and approximately 50% have CS rates >15%. 54 countries with CS rates <10% account for only 25% (4.5 millions) of the global CS. On the other hand, 73% (13.5 millions) of the total number of CS are performed in the 69 countries with CS rates >15% where 37.5% (48.4 millions) of the total number of births occur. While the acceptable global rate is 15%. The statistical reports of Iran reveal a high rate of C/S (41.9%) [3]. The maternal morbidity rate is increased twofold with cesarean delivery compared with vaginal delivery. Re hospitalization in the 30 days following cesarean delivery was more than twice as common as after vaginal delivery [1].

The high rate of C/S in our country has been taken into consideration by health experts. The ministry of health, treatment and medical education is concerned about the issue and studies have to be conducted about the factors that result in such an increase in the rate of cesarean section.

The aim of prenatal care is maintaining a healthy pregnancy, and favorable mental and physical health of the mother, child, and families [4]. Non-medical factors, as much related to the obstetricians as to pregnant women's attitudes, play an important role [5].

The Brazilian woman's preference for non medically indicated cesarean sections is associated with a higher socioeconomic level, white ethnicity, higher education and higher adequacy of maternal care. It also seems that the tendency of cesarean section due to the belief that the quality of maternal care is closely associated to the technology used in the cesarean sections [6].

Studies have shown that appropriate prenatal care is effective interventions to improve pregnancy Consequences [7]. Adequate maternal care provides opportunity for consulting and reducing complications related to pregnancy and delivery [8]. Adequate prenatal cares include as a main part of health services with the aim of reducing the incidence of perinatal complications, increasing pregnant women knowledge towards potential perinatal risk factors, as well as treating any medical condition leading poor outcome of pregnancy [9].

Some studies suggest an association between adequacy of prenatal care and birth outcomes and several prenatal care indices are used to evaluate this association. Each of these indices makes use of information on the time of prenatal care initiation, the total number of prenatal visits, and gestational age at birth. Therefore, prenatal care is categorized according to different analyses [10]. Adequacy of prenatal care utilization (APNCU) is an index for measuring accuracy of prenatal care. This index includes the time of the first visit and the number of its cares. APNCU does not evaluates the quality of service, but evaluates the quantitative care received [11]. It seems that the consequences of these prenatal cares and their effects on pregnancy outcome can be potentially associated with the quality and adequacy of these cares. Thus, accurate assessment of prenatal care utilization can be the critical step in developing public health programs in every society to improve birth outcomes. This study aimed to study association between the adequacy of prenatal cares and cesarean section, in a sample of Iranian women.

OBJECTIVES

This study aimed to evaluate between the adequacy of prenatal cares and cesarean section.

MATERIALS & METHODS

A case-control study was conducted in Shahroud, Iran, 2013. The aim of assessing relationship between prenatal cares and cesarean section and thus comparing this outcome between those with and without receiving these cares.

The sample size was estimated using a power of 80%, significance level of 0.05, 95% confidence intervals and the least extreme Odds Ratio to be detected: 1.80. The estimated sample size was 200 women in each group. The target population was 400 women who were delivered in the Fatemieh hospital. The study population consisted of two groups. The case group (n = 200) was women who had been cesarean section. The control group (n = 200) was including age-matched women who had vaginal delivery. The adequacy of prenatal care was leveled according to the adequacy of prenatal care utilization (APNCU).

Data collection included checklist of basic characteristics and a questionnaire of 34 questions. Profile of the study subjects included, lack of history of cesarean section, lack of medical and psychiatric illnesses during the last pregnancy.

Using an especial questionnaire, the information related to the adequacy of prenatal care were categorized according to the (APNCU) based on the timing of prenatal care initiation and the frequency of visits received after initiation adjusted relative to gestational age at delivery, to assign women to categories such as "inadequate", "intermediate", "adequate", and "intensive" prenatal cares [11]. The internal consistency reliability of the questionnaire was assessed by a test-retest analysis and using Cronbach's alpha that was measured as 0.979. Also, Content validity of the questionnaire was assessed and confirmed using a panel of reproductive health experts. All collected data were structured and transferred into the study computerized database.

The APNCU Index (often referred to as the Kotelchuck Index) includes, gestational age of the newborn, The onset of prenatal care, and the number of prenatal visits made [11]. According to the ACOG standards (one visit per month through 28 weeks, one visit every 2 weeks through 36 weeks, and one visit per week thereafter, adjusted for data of initiation of PNC). According to the APNCU index, Adequacy of prenatal care categorized as:

- Intensive: Prenatal care begins by the 4th month and 110% or more of recommended visits received.
- Adequate: Prenatal care begins by the 4th month and 80%-109% of recommended visits received

- Intermediate: Prenatal care begins by the 4th month and 50%-79% of recommended visits received
 - Inadequate: Prenatal care begins after the 4th month or less than 50% of recommended visits received
- In Iran, according to standardized protocol of mothers in the instructions of the Ministry of Health and Medical Education, the usual number of cares for low-risk pregnancy is eight (based on gestation weeks). It considered two cares in the first half of pregnancy (6-20 weeks) and six cares in the second half (21-40 weeks)(12). APNCU measured, based on this standardized protocol.

Following the ethical principles established in the Helsinki Declaration, all Ethical issues (such as informed consent, conflict of interest, misconduct, co-authorship, double submission, etc.) have been considered carefully. Written informed consent was obtained from all the study participants.

Ethical permission (N0.91/2012) for the study was obtained from the Research Ethics Student Research Committee, Department of Reproductive Health, Shahroud University of Medical Sciences.

The chi-square test was used to evaluate the association among variables. The significance level was 5% ($\alpha = 0.05$) for rejection of the null hypothesis. Main predictors of P values of 0.05 or less were considered statistically significant. To determine the effect of each variable on cesarean section, odds ratios with 95% confidence intervals were calculated using the logistic regression model. The minimum power of the statistical test was 80%. All statistical analyses were performed by using SPSS version 19.0 for windows.

RESULTS

In this study, the study population consisted of two groups. The case group ($n = 200$) was women who had been cesarean section. The control group ($n = 200$) was Including age-matched women who had vaginal delivery. The mean age of the groups was 27.40 ± 5.10 years and 26.53 ± 6.05 years with no significant difference ($p = 0.273$). The two groups were comparable in terms of spouses' age, mean weight, body mass index, the educational level, occupational states, residency in urban or rural areas, the number of children, the previous history of different types of surgical interventions, used supplement drugs, history of cigarette smoking, history of abortion and unintended pregnancy, infertility, history of systemic disease (table 1). Considering APNCU Index, the case group received more adequate prenatal care (OR =1.59, 95% CI 1.06 -2.49, $P = 0.042$) and the case group received more prenatal care in Non-government services (OR =3.53, 95% CI 1.56 -6.70, $P = 0.0001$). According to APNCU Index, 22% of antenatal care in the case group were in the other levels, with no differences between groups (table 2).

Table 1: Baseline characteristics and clinical data of study population

characteristics	case group	control group	p-value
Age (year)	27.40 ± 5.10	26.53 ± 6.05	0.273
age of spouse (year)	31.41 ± 5.38	31.28 ± 6.63	0.879
Weight(kg)	70.72 ± 12.57	67.82 ± 13.62	0.134
BMI (kg/m ²)	27.11 ± 4.56	27.93 ± 5.09	0.107
education level:			0.058
sub-diploma	29%	46%	
diploma	46%	34%	
higher degree	25%	20%	
education level of spouse			0.287
sub-diploma	36%	44%	
diploma	36%	33%	
higher degree	28%	23%	
occupation state			0.336
housewife	87%	91%	
employed	7%	5%	
student	2%	2%	
others	4%	2%	
occupation state of spouse			0.146
employed	84%	87%	
unemployed	0%	5%	
Others	16%	8%	
Residency			0.063
Urban area	73%	61%	
rural area	27%	39%	
history of systemic disease	3%	2%	0.988

history of surgery	40%	35%	0.493
use of drug supplements	69%	61%	0.251
cigarette smoking	2%	1%	0.999
history of abortion	8%	0%	0.316
unintended pregnancy	34%	35%	0.882
infertility	6%	4%	0.063

Table 2: Association between cesarean section and adequacy of prenatal cares

Items	inadequate		intermediate		adequate		intensive	
	case	control	case	control	case	control	case	control
cesarean section	7 (%3.5)	6 (%3)	18 (9%)	24 (%12)	156 (78%)	138 (%69)	19 (%8.5)	32 (%16)
p-value & Odd ratio	Odd ratio = 1.17 95% CI = 0.38 to 3.55 Z statistic = 0.28 P = 0.77		Odd ratio = 0.72 95% CI = 0.38 to 1.38 Z statistic = -0.97 P = 0.32		Odd ratio = 1.59 95% CI = 1.06 to 2.49 Z statistic = 2.032 P = 0.042		Odd ratio = 0.55 95% CI = 0.30 to 1.00 Z statistic = 1.92 P = 0.53	
Non-government services	3 (%1.5)	6 (%3)	5 (%2.5)	11 (%6.5)	186 (93%)	158 (%79)	6 (%3)	25 (%12.5)
p-value & Odd ratio	Odd ratio = 0.49 95% CI = 0.12 to 1.99 Z statistic = 0.99 P = 0.3213		Odd ratio = 0.44 95% CI = 0.15 to 1.29 Z statistic = 1.49 P = 0.1354		Odd ratio = 3.53 95% CI = 1.56 to 6.70 Z statistic = 3.85 P = 0.0001		Odd ratio = 0.21 95% CI = 0.08 to 0.54 Z statistic = 3.28 P = 0.0010	

DISCUSSION

Based on the results of this research there is a relationship between prenatal care and cesarean section. Also there is a relationship between prenatal care in Non-governmental services and cesarean section. Women who delivered by cesarean section had received more adequate care than vaginal delivery group. Also these women had received more service by non-Governmental center and prenatal care doctors than vaginal delivery groups.

It seems, women who having had CS, the suggestions from healthcare providers during pregnancy and labor for CS were important in women's decision-making. Furthermore, attending a delivery education classes and staying with women who had CS also associated with CS. Women tendency to CS in the absence for medical indications and supply-induced demand help to increase the CS rate(13). Research conducted in China showed that there are different reasons for the tendency of mothers for Caesarean section: choice of a specific birth date, fear of pain, the wish to keep fit, and believed that cesarean section is safer than vaginal delivery [14].

Health care providers' attitude towards CS is likely to have a significant impact on women's perspectives because mothers receiving more information about pregnancy and delivery from them. For health care providers, CS is being performed at the controlled time and in the short term, Avoid prosecution arising from medical malpractice. CS is also more profitable than vaginal delivery (15).

In a research conducted by Abbaspoor, *et al.* [16] in an urban area of Iran, a vicious cycle of causes and factors was found that affects the delivery method chosen by mothers. Although mother's demand is considered as the major reason for cesarean operation to be so prevalent, actually, mother's demand is an effect. Social, cultural, religious and economic factors affecting the election of the type of delivery by Iranian society. Attending to the factors influencing women's decision-making on the type of delivery by health care policy-makers can reduce the number of CS without medical reasons [16].

In a research conducted by Hajianv *et al.* [17] in Shahroud, Normal vaginal delivery should be disseminated through holding efficient educational courses to be attended both by the pregnant women and by their husbands, making other required alternatives accessible so that a normal and painless delivery can be accomplished leaving the least number of complications, improving the quality of midwifery services offered when the patient suffers from labor pain, clarification of midwives and obstetricians' tasks for a normal delivery, and motivating the normal delivery team through esteeming their professional dignity.

In a research conducted by Wei Deng, *et al.* [20] in China, Entitled "Cesarean section in Shanghai: women's or healthcare provider's preferences?" , it was concluded that in the primiparous women without a medical reasons for CS, provider suggestion was a strong predictor for cesarean section [18]. A

major reason for the increasing number of unnecessary CS is maternal request [19]. A systematic review, however, concluded that only a few women in countries around the world tend to have a Cesarean section.

In a research conducted by Torloni, *et al* in 2013 in Italy, Entitled "Do Italian women prefer cesarean section? Results from a survey on mode of delivery preferences" it was concluded that, 20% of Italian women prefer cesarean section for the this reasons: younger age, nulliparity, lower instruction and a previous CS [21].

In summary, adequate prenatal care leads not only effectively prevent poor pregnancy outcome, but also higher tendency to cesarean section in pregnant women. The findings of this study have indicated that health care providers have the crucial role in the decision making of mothers.

Despite the association found in the study, we cannot conclude that cesarean section would be prevented only by an inadequate prenatal care, as cesarean section is associated with factors of complex and multifactorial etiology. The results could be used to plan monitoring measures and evaluate programs of health care assistance during pregnancy, at delivery, focusing on reduced cesarean sections rates. That should be more investigated in further studies.

ABBREVIATIONS

Adequacy of prenatal care utilization (APNCU).

COMPETING INTERESTS

The authors declare that they have no competing interests.

AUTHORS' CONTRIBUTIONS

FO has made substantial contributions to conception and design, acquisition, analysis and interpretation of data and drafted, writing the manuscript. NB has made substantial contributions to the acquisition of data. AK participated in the design of the study and revised the manuscript critically. All authors read and approved the manuscript.

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