



HOW FEMALE STERILIZATION PLAYS ITS ROLE IN DECREASING INDONESIAN TOTAL FERTILITY RATE?

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Female sterilization is one of Long Period Contraception Methods (LPCMs) known in Indonesia that can be performed right after the cesarean section, whether it is elective or emergency. Cesarean section cases increase steadily by 30% (Sardjito Hospital 2007). National Family Planning Program in Indonesia intends to elevate the percentage of this method. However, the achievement is still very low at 3%. The present research aims to conduct a social mapping regarding female sterilization in cesarean section. Retrospective cohort is chosen as a method and the data are quantified using univariate, bivariate and multivariate analysis. The study confirms that female sterilization is greater in elective than emergency circumstances. Women in parity ≥ 3 , age ≥ 35 , and having previous cesarean section are some supporting variables. To meet the national target, some policy and research implications will be discussed.

A. INTRODUCTION

Female sterilization is called tubal sterilization, tubal ligation, voluntary contraceptive surgery, tubectomy, bi-tubal ligation, fallopian tubes tied, minilap and "an operation". Female sterilization is a permanent method of birth control by way of the fallopian canal is cut or tied, clamped, burned or disposed¹. The most effective method of contraception is sterilization and the procedure is done through minilaparotomy and laparoscopy. Previous research indicates that the failure of this procedure for (0.1%) - (0.2%) and depending on the operation procedure².

Some women perform female sterilization during cesarean section delivery. Female sterilization usually done at the time of cesarean section delivery to avoid the possibility of a second cesarean

section³. At first the sterilization performed on the occasion of the surgeons open the abdomen of a woman because of medical indications, for example at the time of cesarean section, tumor surgery, laparotomy in ectopic pregnancy⁴. Cesarean section operation has been known for more than a century as an ideal time for obstetricians perform sterilization, usually by minimizing the pain, through one method of tubal ligation. Female sterilization can be done at the time of cesarean section⁵.

Based on IDHS 2007, the national prevalence of female sterilization (3.0%) and (3.5%) to Yogyakarta. Prevalence of national cesarean section delivery (4.1%) and (6.3%) to Yogyakarta. This is a fairly high number compared with other provinces. Specific data on DR. Sardjito Yogyakarta in 2007 about as many as 67 cases of female sterilization, while the cesarean section delivery of 479 cases.

The number of women who delivered by cesarean section increased, but still a bit that utilizes female sterilization. This is a gap between expectation and reality. The expectation that women who delivered by cesarean section and had indications for sterilization in order to take female sterilization, and in fact there are still many women who give birth by cesarean section and had indications but did not take female sterilization. Based on this reason it is necessary to do research on sterilization of women who delivered by cesarean section.

B. METHOD

This research was conducted using a type of observational analytic study design with retrospective cohort or historical cohort study or non-concurrent prospective study. The quantitative approach used to determine the relationship between cesarean section delivery with female sterilization based on medical record data. The population is all women who delivered by cesarean section at Dr. Sardjito Yogyakarta.

Data analysis using Intercooled Stata software version 8.0 which consists of: a) the univariate analysis, b) bivariate analysis using chi-square test to identify whether there is any relationship

between the independent variables (cesarean section) and dependent variable (female sterilization), and confounding variables (age, parity, previous cesarean section, level of education and employment status) with free variables. c) binomial regression multivariable analysis.

C. RESULTS

1. Description of Respondents

Table 1 shows that women who delivered by cesarean section and a lower female sterilization (66.6%) compared with women who delivered by cesarean section and does not perform female sterilization. The average age of the whole subject of the study was 32.4 years. Furthermore, the age is categorized into two groups: <25 and \geq 35 years and 20-34 years. Data obtained from the research that is not found in women who delivered by cesarean section age <25 years, so that in subsequent analysis are categorized into age \geq 35 years and 25-34 years. Number of children ever born by the research subjects vary from one child to six children. Overall, most subjects had two children with total 39 persons (38.2%), whereas the lowest number of children who are six children as much as two people (2.0%).

Table 1. Characteristics of research subjects

Characteristics of Research Subjects	Total (n = 102)	
Female Sterilization n (%)		
Yes	17	16.7
Not	85	83.3
Cesarean section n (%)		
Elective	51	50.0
Emergency	51	50.0
Age \bar{x} (SD)	32.4	4.2
Parity n (%)		
1	33	32.4
2	39	38.2
3	24	23.5
4	4	3.9
6	2	2.0
Previous cesarean section n (%)		
Yes	38	37.2
Not	64	62.8
Education Level n (%)		

No School	2	2.0
Elementary	12	11.8
Junior High	10	9.8
High School	33	32.4
Diploma	13	12.8
Higher Education	32	31.4
Employment status n (%)		
Housewife	58	56.9
Workers	3	2.9
Traders / Entrepreneurs	8	7.8
PNS / TNI / Police	16	15.7
Private Employees	17	16.7

In general, women who perform the previous cesarean section were 38 women (37.2%). Highest education level attained by the majority of respondents were high school (32.5%), whereas those achieving higher education (31.4%). Furthermore, educational level classified into higher education and low education. Percentage women who delivered by cesarean section and become a housewife is the largest of the whole subject of the study (56.9%). While women working as private employees as much (16.7%).

2. Bivariate Analysis

a. Relations Cesarean Section, Age, Parity, Cesarean Section Previously, Education Level, Employment Status Of Female Sterilization

Table 2 shows that the variables elective cesarean section were statistically and practically significant in the variable perform female sterilization with p value of 0.034 and the value RR of 3.25 (CI 95%: 1.14 to 9.30). Incidence female sterilization in women who delivered by cesarean section 3.25 times greater elective compared with women who delivered by emergency cesarean section.

While other variables that have statistically and practically significant with the variables female sterilization are the variable age ≥ 35 years with a p value of 0.005 and RR 3.83 (95% CI: 1.55 to 9.47), parity ≥ 3 with p value of 0.000 and RR 11.2 (95% CI: 3.47 to 36.16), and previous cesarean section with the p value of 0.005 and RR 4.04 (95% CI:

1.54-10 , 59). Bivariate analysis show that age ≥ 35 , parity ≥ 3 , and previous cesarean section have a greater incidence of female sterilization compared with women who did not perform sterilization.

Table 2. Analysis relationships of cesarean section, age, parity, previous cesarean section, educational level, employment status of female sterilization

Variable	Female sterilization		χ^2 (1)	p	RR	95% CI
	Yes	Not				
	n (%)	n (%)				
Cesarean section						
Elective	13 (25.5)	38 (74.5)	4.52	0.034 *	3.25	1.14 to 9.30
Emergency	4 (7.8)	47 (92.2)				
Age						
≥ 35	11 (33.3)	22 (66.7)	8.06	0.005 *	3.83	1.55 to 9.47
5-34	6 (8.7)	63 (91.3)				
Parity						
≥ 3	14 (46.7)	16 (53.3)	24.57	0.000 *	11.2	3.47 to 36.16
1-2	3 (4.2)	69 (95.8)				
Previous cesarean section						
Yes	12 (31.6)	26 (68.4)	8.06	0.005 *	4.04	1.54 to 10.59
Not	5 (7.8)	59 (92.2)				
Education Level						
High	11 (14.1)	67 (85.9)	0.88	0.348	0.56	0.23 to 1.36
Low	6 (25.0)	18 (75.0)				
Employment Status						
Work	9 (20.5)	35 (79.5)	0.39	0.531	1.48	0.62 to 3.53
Not Working	8 (13.8)	50 (86.2)				

RR = Relative Risk CI = Confidence Interval

* = Significant

b. Relationship Age, parity, cesarean section previously, Education Level, Employment Status of cesarean section

Table 3 shows that women who perform the previous cesarean section are statistically related to the Elective cesarean section with a chi-square values of 5.07 and p value of 0.024. While the variables of age, parity, educational level and employment status had no connection with cesarean section is marked with a p value of which exceeds the rate of p

<0.05. The conclusion that can be drawn that the variable of previous cesarean section were statistically and practically significant on the variables female sterilization and cesarean section variable. Previous cesarean section so that the variables suspected as potential confounding variables are equally affected by both the independent variable dependent variable cesarean section and female sterilization.

Table 3. Analysis of correlation between age, parity, previous cesarean section, educational level, employment status of cesarean section

Variable	Cesarean section		χ^2 (1)	p	RR	95% CI
	Elective	Emergency				
	n (%)	n (%)				
Age						
≥ 35	17 (51.5)	16 (48.5)	0.00	1.000	1.05	0.69 to 1.57
25-34	34 (49.3)	35 (50.7)				
Parity						
≥ 3	16 (53.3)	14 (46.7)	0.05	0.828	1.09	0.73 to 1.65
1-2	35 (48.6)	37 (51.4)				
Previous cesarean section						
Yes	25 (65.8)	13 (34.2)	5.07	0.024 *	1.62	1.11 to 2.36
Not	26 (40.6)	38 (59.4)				
Education Level						
High	42 (53.8)	36 (46.2)	1.36	0.243	1.44	0.82 to 2.50
Low	9 (37.5)	15 (62.5)				
Employment Status						
Work	23 (52.3)	21 (47.7)	0.04	0.842	1.08	0.73 to 1.59
Not Working	8 (48.3)	30 (51.7)				

* = Significant

3. Multivariable analysis

Model 1 was built with the aim to test the relationship between cesarean section variable with variable female sterilization without including other variables. In this multivaribel analysis obtained value RR of 3.25 (95% CI: 1.14 to 9.30). The conclusion that can be drawn from this model that the incidence of female sterilization is 3.25 times greater in the group of women who delivered by elective cesarean section compared with the women who delivered by emergency cesarean section. Range (95% CI: 1.14 to 9.30) illustrate that the RR of 3.25 lies in the range of 1.14 to 9.30 in the population covered.

Table 4. Binomial regression analysis of the relationship between cesarean section with female sterilization after controlling age, parity and previous cesarean section

Variable	Model 1 RR (95% CI)	Model 2 RR (95% CI)	Model 3 RR (95% CI)	Model 4 RR (95% CI)	Model 5 RR (95% CI)	Model 6 RR (95% CI)
Cesarean section						
Elective	3.25 * (1.14 to 9.30)	1.44 (0.90 to 2.31)	2.44 (0.85 to 7.00)	2.48 (0.99 to 6.20)	2.70 * (1.07 to 6.86)	3.06 * (1.12 to 8.42)
Emergency	1	1	1	1	1	1
Age						
≥ 35		2.32 * (1.18 to 4.56)		1.61 (0.73 to 3.57)		3.66 * (1.52 to 8.79)
25-34		1		1		1
Parity						
≥ 3		8.24 * (2.61 to 26.03)		8.50 * (2.52 to 28.62)	10.33 * (3.26 to 32.79)	
1-2		1		1	1	
Previous cesarean section						
Yes		3.58 * (1.64 to 7.81)	3.31 * (1.24 to 8.78)			
Not		1	1			
Deviance	85.94	48.47	79.10	58.99	60.61	76.81
R²	0.05	0.32	0.11	0.27	0.26	0.13
N	102	102	102	102	102	102

* = Significant

Model 2 was built with the aim to test the relationship between cesarean section variable with variable female sterilization after controlling variables of age, parity and previous cesarean section. In this model obtained the value RR of 1.44 (95% CI: 0.90 to 2.31). This means that the incidence of female sterilization is 1.44 times greater in women who delivered by elective cesarean section compared with women who delivered by emergency cesarean section. While other variables that control the relationships with female sterilization cesarean section, among others: the age variable has a significant relationship with RR and 2.32 (95% CI: 1.18 to 4.56). Variable Parity also had significant relationship with the value and RR 8.24 (95% CI: 2.61 to 26.03). Variables previous cesarean section also has a significant relationship between values and RR 3.58 (95% CI: 1.64 to 7.81).

Model 3 was built with the aim to test the relationship between cesarean section variable with variable variables include female sterilization after previous cesarean section. Analysis showed that the relationship between elective cesarean section by female sterilization after controlling the variables perform cesarean section previously obtained value RR of 2.44. Unrelationship between elective cesarean section with female sterilization after cesarean section previously controlled variable, the variable of previous cesarean section proved to be a confounding variable on the relationship between cesarean section and Elective of female sterilization. Previous cesarean section were statistically significant for female sterilization with RR 3.31 (95% CI: 1.24 to 8.78).

Model 4 was built with the aim to test the relationship between cesarean section variable with variable female sterilization after variables include age and parity. Analysis showed that the relationship between elective cesarean section by female sterilization after the control variables of age ≥ 35 years and parity ≥ 3 obtained a value RR of 2.48 (95% CI: 0.99 to 6.20). Occurs statistically significant and practical relationship between parity ≥ 3 with female sterilization with RR 8.50 (95% CI: 2.52 to 28.62). This means that women with parity ≥ 3 have 8.50 times greater incidence for female sterilization compared with women

with parity 1-2. While age ≥ 35 years have only practically meaningful relationships with female sterilization with RR 1.61 (95% CI: 0.73 to 3.57).

Model 5 was built with the aim to test the relationship between cesarean section variable with variables include female sterilization after parity. The analysis shows that the relationship between elective cesarean section by female sterilization after controlling the variables of parity ≥ 3 obtained by the RR value amounted to 2.70 (95% CI: 1.07 to 6.86). There is a change in RR from 3.25 to 2.70 depicting happen statistically significant relationship between the practical Elective of cesarean section and parity \geq three to perform female sterilization. Parity was statistically significant and practically to the sterilization of women with RR 10.33 (95% CI: 3.26 to 32.79).

Model 6 is built to know the relationship between cesarean section with sterilization of women after the age variable included. Analysis showed that the relationship between elective cesarean section with female sterilization was obtained after controlling the variables of age RR 3.06 (95% CI: 1.12 to 8.42). There is a change in RR from 3.25 to 3.06 depicting there a significant relationship between cesarean section and Elective aged ≥ 35 years of female sterilization in women who gave birth by cesarean section because there is a change of RR. This means that women who give birth by elective cesarean section and age ≥ 35 years have 3.66 times higher incidence for female sterilization compared with women who delivered by emergency cesarean section.

DISCUSSION

The results of this study showed that women who delivered by cesarean section and sterilization for women (16.7%) was lower (66.6%) compared with women who delivered by cesarean section and does not perform female sterilization (Table 5). This is consistent with research Moreno et al. ⁶ that states that women who delivered by cesarean section and perform only female sterilization (27.4%) was lower (45.2%) compared with women who delivered by cesarean section and sterilization did

not perform women. These results contrast with studies stating Verkuyl^{seven} women who delivered with cesarean section and sterilization for women (60.2%) was higher (20.4%) than women who give birth by cesarean section and does not perform female sterilization.

This study also showed that the average age of women who delivered by cesarean section is 32.4 years of the whole subject of research. This is in accordance with the research Mikki et al.⁸ which states that women who delivered by cesarean section is higher in the age ≥ 30 . The result of bivariate analysis also showed that women aged ≥ 35 have a higher incidence of female sterilization is 3.83 times greater compared with women aged 25-34 years.

Meanwhile, the research illustrates that women who delivered by cesarean section more in the second parity group of children (38.2%). This is consistent with Hopkins & Amaral⁹ which states that women who delivered by cesarean section more on the women's group two children of parity (46.6%). However, contrary to research conducted Omu et al.¹⁰ stating that women who delivered by cesarean section more parity in women an children amounted to (29.8%).

Similarly, research shows that women who delivered by cesarean section and cesarean section prior to registration (37.2%) was lower compared with women who delivered by cesarean section and does not perform cesarean section before registration (62.8%). This is in contrast with the research Mikki et al.⁸ which states that women who give birth by cesarean section and cesarean section before registration (47.0%) higher compared with women who gave birth by cesarean section and does not perform the previous cesarean section at (9 , 6%).

The level of education that dominates the women who delivered by cesarean section is the Senior High School (SLTA) in the amount (32.4%), followed later with college registration (31.4%). This is in contrast with the research Braveman et al.¹¹ who explained that women who delivered by cesarean section more on the level of college education equal to (28.2%), followed later by high school registration (24.7%).

The results of this study prove that there is a statistically significant relationship between cesarean section and practical with female sterilization. Incidents female sterilization is higher in women

who delivered by cesarean section compared with the Elective of women who delivered by emergency cesarean section (Table 5). The results are consistent with research conducted by Verkuyl ⁷, which concluded that the incidence of cesarean section have a Elective of female sterilization is higher than the emergency cesarean section. Bivariate analysis showed that women who delivered by cesarean section have a Elective of 3.25 times higher incidence of female sterilization compared to women who delivered by emergency cesarean section.

Bivariate analysis showed statistically significant relationships and practical age, parity and previous cesarean section on female sterilization. This is consistent with Ross ¹² which explains that the age, parity, religion, marital status, race and residence are several factors strongly associated with sterilization operation. The results of this study showed that women aged \geq 35 years had a greater incidence of female sterilization compared with women aged 25-34 years. Engenderhealth ¹³ explains that the social economy, religion, marital status, number of children, child sex, age at sterilization, race and ethnicity as well as social and psychological factors have a strong influence for female sterilization.

Previous cesarean section have a statistically significant relationship and practical response to female sterilization. This can be seen on the results of bivariate analysis (Table 5). Analysis showed that the incidence of female sterilization is greater in women who did the previous cesarean section than did the previous cesarean section. This is consistent with research Mutihir et al. ¹⁴ explains that there is a relationship between previous cesarean section cesarean section. In this study a theoretical framework mentioned that one of the factors affecting the female sterilization previous cesarean section. According Mochtar ⁴, the factors that influence to do female sterilization among others which were included in obstetric medical indication is recurrent toxemia gravidarum, repeated cesarean section, obstetric hysterectomies, and so forth.

Incidence female sterilization in women who have a greater level of higher education compared with women who have low education levels. This is according to research conducted Chandra ¹⁵ shows the results of his research that the high school level up, college diploma or have a greater

incidence of sterilization compared with non-upper-level secondary school. However, in contrast to the results of research Jamieson et al. ¹⁶ explains that women have a low education level incidents to make sterilization more than women of higher education level.

The result of bivariate analysis showed that there was no significant relationship between age and cesarean section (Table 6). Women aged ≥ 35 years the incidence of cesarean section have a lower Elective than women aged 25-34 years. This is consistent with studies of Al Nuaim et al. ¹⁷ showed that women age ≥ 35 years the incidence of cesarean section have a Elective of lower than 25-34 years old lady. However, these results contrast with research Krebs & Langhoff-Ross ¹⁸ concluded that women age ≥ 35 years the incidence of cesarean section have more Electives than women aged 25-34 years. According to Braveman et al. ¹¹, that age ≥ 35 years had significant relationship with cesarean section. However, in contrast to the results of research Taffel et al. ¹⁹, stated that the age 25-34 had significant relationship with cesarean section.

Similarly, results of studies showing that parity has no significant relationship with cesarean section. Women of parity ≥ 3 has a lower incidence of cesarean section compared with women of parity 1-2. This is consistent with studies of Al Nuaim, et al. ¹⁷ which states that a higher incidence of cesarean section in women compared with women of parity 1-2 parity ≥ 3 . While the results of this study contrast with Hopkins & Amaral ^{nine} studies showing that women of parity ≥ 3 has a significant relationship with cesarean section. Women of parity ≥ 3 has a greater incidence of cesarean section compared with women of parity 1-2. The difference results probably due to cultural research, the location and design research. These results support research conducted by Mikki et al. ⁸ which proves that there is a significant relationship between previous cesarean section cesarean section. The incidence of previous cesarean section was higher in women who delivered by cesarean section compared with the Electives women who delivered by emergency cesarean section .

Multivariable analysis found that previous cesarean section had the same significant relationship to female sterilization and cesarean section. It can be seen from the results of the analysis showed a

statistically significant value and practical. So we can say that previous cesarean section a potential confounding variable (confounding) in the relationship between cesarean section on female sterilization. The results showed that previous cesarean section proved to be a confounding, because it affects the value of the relationship between cesarean section on female sterilization.

RR 2.44 95% CI and range that exceeded 1.

CONCLUSIONS AND RECOMMENDATIONS

Incidence female sterilization is higher in the group of women who delivered by cesarean section compared with a group selected women who delivered by emergency cesarean section. Cesarean section have options that were statistically significant relationships and practices in the sterilization of women. Incidence female sterilization is higher in the group of women aged \geq 35 years, parity \geq 3 children and previous cesarean section compared with a group of women aged 25-34 years, parity 1-2 and did not do the previous cesarean section. Previous cesarean section variables proved to be a confounding variable (confounding) variables on the relationship between cesarean section with sterilization of women. Education levels and employment status have a relationship that was not statistically significant for female sterilization.

For health care workers to perform better counseling to women about female sterilization during cesarean section delivery or emergency good Elective. Women who had \geq 3 children, age over 35 years and have a history of previous cesarean section should get more attention for the use of contraceptive methods especially female sterilization during cesarean section delivery. Especially for women of parity \geq 3 children are encouraged to perform female sterilization as a contraceptive method of Elective is most important. Relevant agencies such as the health department and BKKBN will need to provide communication, information and education (IEC) better about female sterilization during cesarean section delivery and good selection of emergency, including post-vaginal delivery.

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