

The effect of Self-Rated Health in Pregnancy on the type of delivery in Bandar Abbas pregnancy cohort, 2016-2018

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Research article

Keywords: Self-Rated Health, Cesarean section, Prospective cohort study

Posted Date: October 10th, 2019

DOI: <https://doi.org/10.21203/rs.2.15895/v1>

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Abstract

Background Self-rated health in pregnancy can be a predictor of adverse childbirth outcomes and maternal health problems. The aim of the present study was to investigate the effect of maternal self-rated health on the type of delivery in Bandar Abbas pregnancy cohort.

Methods This study used data of 247 mothers registered in a prospective cohort study on pregnant women in the suburbs of Bandar Abbas city, South of Iran. Self-rated health of mothers in pregnancy was measured by the answer to the question: "How do you evaluate your health in general?" The study outcome defined as having cesarean section measured at the second visit during postpartum period. The relative risk (RR) and 95% confidence interval (CI) was calculated using Cox regression models.

Results The prevalence of bad/poor, good/excellent Self-rated health and cesarean section was 19.3% (n=42), 80.97% (n=200) and 40%, respectively. Compared to good self-rated health, the risk of cesarean section was 78% higher (RR= 1.78, 95% CI 1.32-2.4) in mothers with bad self-rated health. The risk of elective cesarean section and emergency cesarean section was 72% (RR= 1.72, 95% CI 1.09– 2.7) and 91% (RR= 1.91, 95% CI 1.04- 3.48) higher in mothers with bad self-rated health, respectively.

Conclusion Our findings showed that self-rated health during pregnancy may effect cesarean section. Accordingly, the integration of screening for mental health morbidities into pregnancy health care packages are proposed.

Introduction

Cesarean Section (C-section) is one of the most common surgeries worldwide [1]. Although World Health Organization had reported the desirable level of C-section to be 10–15% in 1985, it has increased significantly in the last few decades [2]. In Iran, C-section prevalence has increased from 16% in 1985 to 60% in 2013 [3]. According to recent systematic review in Iran, the prevalence of C-section is 48% [4]. This increase in C-section prevalence is followed by more inappropriate maternal and neonatal complications which requires more postpartum care and increases the costs and financial burdens for health system [5, 6].

Pregnancy complications, such as gestational diabetes [7], iron-deficiency anemia, preeclampsia [8], history of infertility, history of abortion [9] and a history of C-section [10] are factors influencing selection of cesarean delivery. In addition, some of the characteristics of the mother including mental health during pregnancy including depression and anxiety disorders during pregnancy [11], fear of childbirth [12], and self-rated health (SRH) are mentioned as factors influencing selection of this kind of delivery [13, 14].

SRH affects the type of delivery through some of factors during pregnancy or childbirth. Bad (poor) SRH has a direct relationship with hypertension, smoking during pregnancy [15], Intra-Uterine Growth Retardation [16, 17], and preterm delivery, all of which are contributors of C-section [18]. On the other hand, some studies also reported lower rates of C-section in people with better self-rated health [13]. Since

SRH is an appropriate measure for evaluating mental health [19] that can affect C-section, and due to lack of native studies regarding the effects of SRH on pregnancy outcomes, this study aims to evaluate the effects of SRH of mothers during pregnancy on their delivery type through a population-based prospective cohort study in suburbs of Bandar Abbas during 2016 to 2018.

Materials And Methods

Study design and Participants

The present study used data from a population-based cohort study entitled: "A Population-based Prospective Study to Identify Contributors to Mother and Child Health in Suburban Communities". The project is being conducted by "Bandar Abbas health-Research station" affiliated to Tehran University of Medical Sciences (TUMS); and Hormozgan University of Medical Sciences Four visits are scheduled in pregnancy, one, six, and twelve months postpartum [20]. The reference population consists of pregnant women residing in the suburban areas of Bandar Abbas city with the socially and economically vulnerable neighborhoods. 1000 pregnant women is under recruitment by door to door sampling scheme. Details of the cohort protocol was published elsewhere [20]. By the time of the present study, the second visit of the cohort (during postpartum) was conducted on 283 singleton pregnancies, which yielded the following results: 14 (4.5%) declined to participate, 12 (3.8%) had migrated, and 10 (3.2%) deliveries ended up with abortion. Therefore, 247 singleton deliveries were entered into the study.

Ethics approval and consent to participate

The Research Ethics Committee of "Ministry of Health and medical education" and "National Institute for Medical Research Development (NIMAD)" approved the protocol (Protocol Number: 943607 and ethical Number: IR.NIMAD.REC.1396.205). Moreover, ethical committee of school of public health of Tehran University of Medical Sciences (TUMS) with the code of 42933244/3246 approved this research. The mothers who agreed to participate were provided with written informed consent and were informed that they could drop out at any time during the study with no harm to themselves or their babies. Due to cultural situations in the area, verbal consent was sought from the husband, if necessary.

Measures

The main exposure of this research was SRH of mothers in pregnancy which was measured by the answer to the question: "How do you evaluate your health in general?" with responses on Likert scale (excellent, good, intermediate, bad, very bad) [19]. SRH was further divided into two categories of poor (intermediate, poor, and very poor) and good (very good and excellent) [21]. On the basis of prior research this variable was treated as categories [17, 19]. Information about maternal self-rated health was collected through the first visit of the cohort during the first trimester. The study outcome was cesarean

delivery, and elective and emergency C-section. Cesarean section was measured by self-report method. One week after delivery, mothers were asked using interviews or telephone call. The confounding variables were maternal age and education, pre-pregnancy body mass index (BMI), gestational age, preterm delivery, socio-economic status of the household, histories of C-section, abortion, and low birth weight infant. Maternal health status during pregnancy and using dietary supplements during pregnancy were also considered. Information about pre-pregnancy BMI was collected base on maternal health records health center. The household socioeconomic status was calculated using the principal component analysis (PCA) on nine household assets (personal car ownership, motorcycle, refrigerator, dishwasher, microwave, personal computer, vacuum cleaner, washing machine, color television). According to the median, socioeconomic status was divided into good (above the middle (≤ 1)) and poor (below the middle level ($0.999 \leq$)). Maternal mental health status during pregnancy was measured by DASS-21 scale [22]. The DASS is a clinical assessment that measures the three related states of depression, anxiety and stress. The validity and reliability of the DASS questionnaire in Iranian population has been confirmed before [23]. Mental impairment degree of the mother was defined by the total score of 33 or higher [22].

Data analysis

For the analyses, the relative risk was calculated using Cox regression models [24]. The log-binomial was proposed at the first step of the research development. At the analysis time; however, we realized that this model had converge problems due to some sparse data in level of the exposure of interest. Because of the sparse data problem, Cox-Regression model was used as an alternative. Typically, Cox regression is used for time-to-event data. To use Cox regression model for this particular situation, an artificial time variable was constructed where every subject has the same observation time and all events occur at the same time. With this assumption, the hazard ratio estimated by Cox regression approximates the relative risk. To investigate the univariable relationship between variables, univariable Cox regression models were used and then each variable with a significance level of less than 0.2 was included into the Cox regression multivariable model [25]. Accordingly, the confounders were previous C-section, maternal body mass index, and socio-economic status for the cesarean section as a whole; previous C-section, history of preterm delivery, mother's body mass index during pregnancy, mother's education, and socio-economic status for elective C-section, and maternal age and socio-economic status for emergency C-section. All the analyses were done by STATA v.14.2 and with a significance level of 5%.

Results

247 pregnant mothers, aged 16 to 42, participated in this study with the mean of 27.09 (5.37). Age category of 25–33 had the highest frequency. Most of the mothers were illiterate or had elementary education (29.96%). Moreover, mothers with a good socioeconomic status had the highest frequency (Table 1).

40.08% of mothers had C-section, and 59.92% had vaginal delivery. Among all the deliveries, 24.29% were elective C-section, and 15.54% were emergency C-section. Among 99 mothers who had C-section, 60.6% had experienced elective, and 39.4% had experienced emergency C-section. 16 mothers had previous preterm delivery, among which 56.25% had C-section. 46 mothers had history of low weight birth, among which 65.22% had vaginal delivery. 200 mothers reported a good SRH, and 47 mothers reported a poor SRH. The information about previous and current pregnancy of the mothers are listed in Table 2.

The Cox regression model indicated that after the adjustment of confounding variables, the risk of C-section is 78% higher in mothers with poor SRH (Adjusted Relative Risk (ARR) = 1.78, 95% Confidence Interval (CI): 1.32, 2.4) (Table 3).

According to the adjusted results of Cox regression model, the risk of elective C-section was 72% higher in mothers with poor SRH (ARR = 1.72, 95%CI: 1.09, 2.7) (Table 4).

The results of Cox regression model indicated that with adjustment of confounding variables, the risk of emergency C-section was 91% higher in mothers with poor SRH (ARR = 1.91, 95%CI:1.04,3.48) (Table 5).

Discussion

The present study aimed to investigate the effects of SRH on the risk of cesarean delivery in 247 members of population-based prospective cohort group in Bandar Abbas city in South of Iran. The results indicated that 19% of the cohort subjects reported poor self-rated health. The prevalence of Cesarean section in our sample was estimated to be 40%. This percentage appears to be higher than the estimated percentages in Saudi Arabia [26] and Iraq [27]; and lower than the estimated 48% pooled prevalence reported by a systematic review study in Iran [28].

SRH is a valid predictor of health status and its reliability is increasingly approved. In comparison with other measures, SRH reflects the individual's perceptions regarding their own health status [29]. Our results indicated that mothers with poor SRH during pregnancy were exposed to 78% higher C-section risk. This percentage is 72% for elective C-section and 91% for emergency C-section. The effect of SRH on cesarean delivery have been reported in a few studies [13, 30].

To be elaborated more, SRH has a direct relationship with some of the factors during pregnancy or childbirth, such as hypertension [31], tobacco smoking [15], low birth weight [16, 17] and preterm delivery [17], all of which are risk factors for choosing the type of delivery. According to the effects of low weight birth on selection of cesarean as the delivery type [32], this factor had probably emerged through mother's mental and health disorders during pregnancy. In the previous study on the cohort, we have shown that the incidence of low birth weight infants (i.e. birth weight below 2500 gram) was higher compared to other parts in Iran [33]. Therefore, it is presumed that low birth weight would effect on the type of delivery, especially choosing cesarean section.

Our results also indicated that the risk of cesarean section was 2.5 times higher in mothers with previous caesarean experience. The effect of previous C-section as a predictor of consequent C-section have been proved in previous researches [32, 34, 35].

Poor SRH during pregnancy is been directly influenced by fear of delivery pain, recommendations of family members and physician for selecting cesarean as the delivery type, and concerns about changes in physical appearance [36, 37]. These factors are also influential in convincing the mother to select cesarean section. We did not have of the information on maternal mental health prior to conception, therefore, we cannot decide whether maternal poor mental health affects cesarean, or whether the history of C-section, lack of social support, and other factors decrease mother's mental health and lead her to select C-section as the delivery type [38].

According to the results, mothers with poor socio-economic status had 61% higher risk of C-section, 65% higher risk of elective C-section, and 73% higher risk of emergency C-section. Previous studies in Iran indicated that elective C-section had a direct relationship with knowledge level of mothers regarding complications of delivery, fear of delivery, encouragements of the physician, recommendations of others, and socio-economic status of the family [37].

Although it is proven that maternal mental health during pregnancy affects delivery outcomes, applying the results in pregnancy health care packages is still in question. Emphasizing on the risks of C-section delivery is not enough for encouraging mothers to select vaginal delivery. Psychological counseling sessions during pregnancy is an appropriate opportunity for those mothers who are willing to select C-section. Therefore, regular screening programs to early diagnosis of mental health abnormalities with standard instruments (such as SCL-8 questionnaire) are highly recommended for pregnant mothers in order to make them aware of the risks of C-section [39].

Our study had some advantages and limitations. Its advantage was the nature of the study, which was prospectively conducted on the population level (population-based). On the other hand, the status of SRH is typically self-report. Therefore, it is possible that the prevalence of SRH would be higher with more false positives in comparison with other psychological diagnostic tests [36]. Moreover, some risk factors for the selection of delivery type was not available or statistically excluded from the analysis (such as the history of abortion, history of difficult delivery, history of chronic diseases) which can affect delivery process and maternal SRH.

Conclusions

Our study indicated that there is a significant relationship between SRH during pregnancy and the type of delivery. Therefore, mothers with poor SRH were more likely to have elective and emergency C-section. Moreover, risk of C-section in mothers with poor socio-economic status or mothers with previous C-section increased significantly. According to the results, analyzing and monitoring mother's mental health, especially during pregnancy, should be developed and receive more support.

Declarations

Abbreviations: C-section: Cesarean Section, SRH: Self-rated health, BMI: Body Mass Index

Acknowledgements

We would like to forward our gratitude to the National Institute for Medical Research Development (NIMAD) for their financial support of this project. We also thank all residents in the study area, whose collaboration and patience is the milestone for the study progress.

Authors' contributions

KH conceptualized and supervised the study, SN coordinated research process, design, and data collection, HM conducted the interviews and undertook the analysis, EK developed the first draft of the manuscript. All authors contributed to subsequent drafts and all authors approved this version of the manuscript for publication.

Competing interests

The authors declare that they have no competing interests.

Funding

This research is funded by the Elite grant of National Institute for medical Research Development (NIMAD) with the code 943607. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

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Tables

Table 1: Demographic characteristics of the pregnant women in suburban of Bandar Abbas, 2017

variable	N (%)	Type of delivery			P-value*
		Elective C-section N (%)	Emergency C-section N (%)	Vaginal N (%)	
Maternal Age (years)					
16-24	83(34.01)	16(19.27)	12(14.45)	55 (66.26)	0.27
25-33	131(52.63)	36(27.48)	19(14.50)	76 (58.01)	
34-42	33 (13.36)	8(24.24)	8(24.24)	17 (51.52)	
BMI [1]					
18.5≥	16(6.48)	1(06.25)	0(00.00)	15 (93.75)	>0.01
18.5-25	103(41.70)	25(24.27)	13(12.62)	65(63.11)	
25-30	91(36.84)	21(23.07)	19(20.87)	51(56.04)	
30≤	37(14.98)	13(35.13)	7(18.91)	17(45.95)	
Socioeconomic status					
Low	74 (29.96)	26(35.13)	16(21.62)	32 (43.24)	>0.01
good	173 (70.04)	34(19.65)	23(13.29)	116 (67.05)	
Maternal Education					
illiterate / reading and writing	74 (29.96)	23(31.08)	9(21.16)	42 (56.76)	0.18
secondary education	63(25.51)	10(15.87)	11(17.46)	42(67.66)	
high school/ diploma	68 (27.53)	14(20.58)	10(14.70)	44 (64.71)	
University	42 (17.00)	13(30.95)	9(21.42)	20 (48.62)	

*Chi-squared test

Table 2: Characteristics of previous and current pregnancy of the pregnant women suburban of Bandar Abbas, 2017

variable	N (%)	Type of delivery			P-value*
		Elective C-section N (%)	Emergency C-section N (%)	Vaginal N (%)	
Maternal self-rated health					
good	200(80.97)	43(21.50)	27(13.50)	130(65.00)	>0.01
bad	47(19.03)	17(36.17)	12(25.53)	18(38.30)	
Mental disorder					
Yes	18(7.29)	5(27.77)	3(16.66)	10(55.56)	0.69
No	129(92.71)	55(42.63)	36(27.90)	138(60.26)	
Iron supplementation in recent pregnancy					
Regular	168(68.02)	40(23.80)	25(14.88)	103(61.31)	0.51
Irregular	79(31.98)	20(25.31)	14(17.72)	45(56.96)	
vitamin D supplementation in recent pregnancy					
Regular	167(67.61)	42(25.14)	29(17.36)	96(57.49)	0.25
Irregular	80(32.39)	18(22.50)	10(12.50)	52(65.00)	
History of C-section [2]					
Yes	29(11.74)	24(82.75)	1(03.44)	4(13.79)	>0.01
No	218(88.26)	36(16.51)	38(17.43)	144(66.06)	
history of preterm delivery					
Yes	16(6.48)	6(37.50)	3(18.75)	7(43.75)	
No	231(93.52)	57(24.67)	35(15.15)	139(58.87)	0.16
History of Abortion					
Yes	22(8.91)	4(18.18)	3(13.63)	15(68.18)	0.40
No	225(91.09)	56(24.88)	36(16.00)	133(59.11)	

*Chi-squared test

Table 3: Unadjusted and adjusted results of Cox regression models for the effect of mental self-rated health during pregnancy on delivery type (C-section / vaginal)

variables	N	Univariable			Multivariable		
		Relative risk	95% CI	P-value	Relative risk	95% CI	P-value
Maternal self-rated health							
good	200	1	-	-	1	-	-
bad	47	1.76	1.31 - 2.36	>0.01	1.78	1.32 - 2.4	>0.01
History of C-section [3]							
No	218	1	-	-	1	-	-
Yes	29	2.53	2.00 - 3.21	>0.01	2.46	1.88 - 3.25	>0.01
Maternal Age (years)							
16-24	83	1	-	-	1	-	-
25-33	131	1.21	0.84 - 1.72	0.31	1.02	0.70 - 1.41	0.69
34-42	33	1.41	0.88 - 1.22	0.14	1.05	0.64 - 1.71	0.46
BMI [4]							
18.5≥	16	1	-	-	1	-	-
18.5-25	103	5.91	0.86 - 40.19	0.07	3.41	0.63 - 28.95	0.12
25-30	91	7.03	1.03 - 47.76	0.04	5.18	0.77 - 34.57	0.08
30≤	37	8.64	1.26 - 59.27	0.02	6.15	0.90 - 41.85	0.05
Socioeconomic status							
good	173	1	-	-	1	-	-
low	74	1.72	1.15 - 2.56	>0.01	1.61	1.17 - 2.22	>0.01

Table 4: Unadjusted and adjusted results of Cox regression models for the effect of mental self-rated health during pregnancy on delivery type (Elective C-section / delivery other)

variables	N	Univariable			Multivariable		
		Relative risk	95% CI	P-value	Relative risk	95% CI	P-value
Maternal self-rated health							
good	43	1	-	-	1	-	-
bad	17	1.67	1.31-2.36	0.02	1.72	1.09-2.71	>0.01
History of C-section							
No	36	1	-	-	1	-	-
Yes	24	5.01	3.55-7.05	>0.01	5.35	3.29-7.90	>0.01
history of preterm delivery							
No	57	1	-	-	1	-	-
Yes	6	1.64	0.81-3.15	0.17	2.26	1.15-4.43	>0.01
BMI [5]							
18.5≥	1	1	-	-	1	-	-
18.5-25	25	3.81	0.56-26.81	0.16	2.42	0.33-17.35	0.37
25-30	21	3.69	0.53-25.65	0.18	2.11	0.30-14.29	0.45
30≤	13	5.62	0.79-39.57	0.08	3.44	0.26-25.59	0.22
Maternal Education							
illiterate / reading and writing	23	1	-	-	1	-	-
secondary education	10	0.51	0.26-0.99	0.04	0.46	0.26-0.81	>0.01
high school/ diploma	14	0.66	0.27-1.18	0.16	0.55	0.33-0.91	0.02
university	13	0.99	0.56-1.75	0.98	0.71	0.40-1.26	0.24
Socioeconomic status							
good	34	1	-	-	1	-	-
low	26	1.78	1.15-2.57	>0.01	1.65	1.07-2.55	0.02

Table 5: Unadjusted and adjusted results of Cox regression models for the effect of mental self-rated health during pregnancy on delivery type (Emergency C-section / delivery other)

variables	N	Univariable			Multivariable		
		Relative risk	95% CI	P-value	Relative risk	95% CI	P-value
Maternal self-rated health							
good	27	1	-	-	1	-	-
bad	12	1.96	1.31- 2.36	0.02	1.91	1.04- 3.48	0.03
[6] History of C-section							
No	38	1	-	-	1	-	-
Yes	1	0.24	0.02- 1.43	0.11	0.21	0.003- 1.37	>0.10
Maternal Age (years)							
16-24	12	1	-	-	1	-	-
25-33	19	0.96	0.49- 1.91	0.92	0.85	0.42- 1.71	0.65
34-42	8	1.69	0.76- 3.77	0.19	1.39	0.60- 3.22	0.43
Socioeconomic status							
good	23	1	-	-	1	-	-
low	16	1.72	0.94- 3.05	0.07	1.73	0.93- 3.23	0.08

[1] Body Mass Index

[2] Cesarean Section

[3] Cesarean Section

[4] Body Mass Index

[5] Body Mass Index

[6] Cesarean Section