Cross-sectional Study

ANNALS OF MEDICINE & SURGERY

OPEN

Prevalence of depression among pregnant women and its correlation with the choice of delivery method

Roya Vaziri-harami, MD[a], Seyyedeh Neda Kazemi, MD[b,d,*], Saharnaz Vaziri-harami, MD[c], Hanieh Najafiarab, MD[b]

Background: Caesarean section is usually limited to cases where natural vaginal delivery is not possible or poses a serious risk to the foetus and mother. Psychological health of mothers is likely to play an important role in the method of delivery. This study aims to investigate the prevalence of depression in pregnant women and its relationship with the choice of delivery method and other demographic parameters.

Methods: In this descriptive cross-sectional study, 250 mothers referring to the hospitals of Shahid Beheshti University of Medical Sciences, Tehran, Iran, were selected, and their demographic information and level of depression was collected using a questionnaire. Statistical analysis was conducted to evaluate the correlation between depression, method of delivery and other associated parameters.

Results: Among 250 pregnant women, 225 (90%) had no depression, 25 (10%) had mild depression and no moderate or severe depression was reported in any pregnant mother. Also, 146 (58.4%) were willing to have a caesarean section and 104 (41.6%) wanted to have a normal delivery. The choice of delivery method was not significantly associated with depression. Analyzes showed that increasing maternal age is associated with a greater tendency to caesarean delivery. The incidence and higher depression scores of mothers showed a significant association with the history of previous abortions.

Conclusion: Although in this study no significant association was observed between depression in pregnant mothers and the choice delivery, due to the high prevalence of caesarean section in the country and its progression to higher percentages, it seems that the design and implementation of effective programs and interventions is required.

Keywords: Caesarean section, demographic factors, depression, pregnant, psychological, vaginal delivery

Introduction

Childbirth, a physiological phenomenon, symbolizes a significant life event for women, marking the transition into maternal identity. While inherently beautiful, the process of childbirth is a complex reality that occasionally necessitates medical intervention to mitigate risks to both mothers and infants. Caesarean section, a method of delivery, becomes indispensable when natural vaginal delivery is unfeasible due to medical reasons. Globally, caesarean section rates have exceeded the recommended 10–15% range set by the WHO since 1985[1], reaching ~18.6%[2]. This increase is accompanied by well-documented complications for both mothers and infants, encompassing pain, infection, reduced sexual desire, bleeding, and respiratory distress syndrome, among others[3].

Despite the convenience associated with caesarean sections, the escalating rates pose threats to maternal and neonatal health, necessitating a closer examination of the factors influencing the choice of delivery method. In recent years, Iran has witnessed a substantial increase in the prevalence of caesarean sections, accounting for nearly 48% of all deliveries. The complications associated with caesarean sections, including increased risks of postpartum infections, urinary problems,

HIGHLIGHTS

- Caesarean section is usually limited to cases where natural vaginal delivery is not possible or poses a serious risk to the foetus and mother.
- The psychological health of mothers is likely to play an important role in the method of delivery. Although in this study no significant association was observed between depression in pregnant mothers and the choice delivery.
- Due to the high prevalence of caesarean section in the country and its progression to higher percentages.
- It seems that the design and implementation of effective programs and interventions is required.

[a]Department of Psychiatry, School of Medicine, Behavioral Sciences Research Center, Imam Hossein Hospital Shahid Beheshti University of Medical Sciences, [b]Preventative Gynecology Research Center, [c]Department of Psychiatry, School of Medicine, Behavioral Sciences Research Center, Shahid Beheshti University of Medical Sciences and [d]Department of Obstetrics and Gynecology, Endocrinology and Female Infertility Unit, Tehran University of Medical Sciences, Tehran, Iran

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article

*Corresponding author. Address: Shahid Beheshti University of Medical Sciences, Tehran, Iran. Tel.: +982 129 902 761, +98 2 122 431 585; fax: +98 2 122 431 878. E-mail: md.sn.kazemi@gmail.com (S.N. Kazemi).

Annals of Medicine & Surgery (2024) 86:2538–2542

Received 24 November 2023; Accepted 4 February 2024

Published online 1 March 2024

http://dx.doi.org/10.1097/MS9.0000000000001849

bleeding, anaesthesia-related issues, and foetal respiratory and jaundice complications, highlight the importance of scrutinizing the factors driving this rising trend.

Psychological factors like mothers' mood, anxiety and fear of vaginal birth are associated with increased incidence of caesarean section[4]. Studies have indicated that women undergoing elective C-section have greater depressive and anxiety symptoms[5]. Increased depression and anxiety during the pregnancy imposes serious outcomes in both, mother and child[6]. Additionally, mental health issues during the pregnancy indicate the complication requiring C-section[7]. Researchers have shown that depression during pregnancy increases the odds of C-section, including those associated with nonmedical reasons[8]. Depression during pregnancy is also associated with adverse foetal and neonatal outcomes[9]. Furthermore, mothers with chronic depression are seen to have more pronounced outcomes in child[10].

This study aims to investigate the intricate relationship between maternal depression and the choice of delivery method, particularly the preference for caesarean section. With the increasing rates of both caesarean sections and maternal depression in Iran, understanding the interplay between these factors becomes crucial[11]. The prevalence of depression in Iranian pregnant women is reported to be 41.8%[12]. This study aims to evaluate the correlation between depression and choice of delivery method among Iranian women and associated factors. By addressing the psychological well-being of pregnant women and identifying the factors contributing to the preference for caesarean section, the study seeks to pave the way for effective interventions and programs aimed at reducing the escalating rates of caesarean sections and promoting maternal mental health.

Methods

Study design

This descriptive cross-sectional study was performed on 250 pregnant women, referred to the teaching hospitals of Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Participants were selected through random sampling. Detailed information about the study was provided to each participant, and after obtaining informed consent, individuals were enroled. Subsequently, a comprehensive medical history was obtained, including demographic details, pregnancy and childbirth history, history of neurological and psychiatric illnesses, and the use of psychiatric medications. The Edinburgh Postnatal Depression Scale (EPDS) questionnaire was administered to assess the level of depression.

Following information was obtained from the patients: age, education, place of residence, occupation, history of pregnancy and childbirth, history of psychiatric illness and use of psychiatric drugs and the method of childbirth selected. The Beck questionnaire was also completed by the mother to assess the state of depression[13].

Inclusion and exclusion criteria

Inclusion criteria involved obtaining the consent of pregnant women willing to participate. Exclusion criteria included the inability to respond to EPDS parameters and maternal dissatisfaction with participation. Those currently on psychiatric drugs and unwilling to participate in the study were excluded.

Categorization of participants

The Beck Depression Inventory consists of 21 questions. Each item has a score of 4, which scores from 0 to 3 depending on the severity of the symptoms. Zero indicates the absence of that symptom and 3 indicates the severity of the same symptom in the patient. This scale covers a wide range of symptoms that are commonly recognized as symptoms of a depressive state. These symptoms include depressed mood, feelings of guilt and guilt, dissatisfaction, suicidal tendencies, insomnia, work and activity, slowness of thinking and behaviour, restlessness, mental anxiety, gastrointestinal physical symptoms, general physical symptoms, sexual symptoms, and weight loss. The maximum score in each case is 3 and the maximum overall score is 63.

After completing Beck questionnaire, based on 21 questions, depression scoring was done. According to which mothers were divided into four categories of scores 0–18 (without depression), 18–28 (with mild depression), 29–35 (with moderate depression and 63–36 (severe depression). The frequency of mothers in this category with demographic parameters such as education level, place of residence, gestational age, history of abortion and choice of delivery method by the mother was examined. Also, the relationship between the mother's preferred method of delivery and factors such as age, education, occupation, place of residence, number of pregnancies, number of abortions, history of anxiety or depression, history of stillbirth and gestational age were analyzed.

Statistical analysis

All statistical analyzes were performed in GraphPad Prism software version 8 and graphs related to statistical analyzes were drawn by this software. Qualitative data were compared by Fisher exact test or χ^2. Quantitative data from the perspective of following the normal distribution were analyzed by Kolmogorov–Smirnov test and then compared by *t*-test and ANOVA.

This study was approved by the Research Ethics Board of Shahid Beheshti University of Medical Sciences, Tehran, Iran.

The work has been reported in line with the STROCSS criteria[14].

Research Registry Unique Identifying Number: research registry9729.

Results

Two hundred fifty pregnant mothers participated in the study. The mean age of mothers was 30.23 ± 5.0 years (range: 18–48). The mean gestational age was 26.4 ± 8.44 weeks (range: 4–40). Fifty-two pregnant mothers (20.8%) had abortions, of which 40, 9 and 3 had 1, 2 and 3 abortions, respectively. Seventeen pregnant mothers (6.8%) had a history of depression, anxiety or other neurological diseases. Twelve of them specified their background. Four people had a history of anxiety, 5 people had a history of depression, 2 people had a history of anxiety and depression and 1 person had a history of anxiety and obsession. Only 1 patient (0.4%) had a history of psychiatric hospitalization due to depression (Table 1).

Overall, the mean score of depression of pregnant women was 7.56 ± 6.04, which indicates that pregnant mothers participating in the study did not have depression. In our study, 225 patients

Table 1

Demographic characteristics of pregnant mothers

Variables	Number, *N* (%)	Category
Age	127 (50.8)	≤30
	123 (49.2)	30<
Gestational age	126 (50.4)	≤28
	124 (49.6)	28<
Job	186 (74.4)	House keeper
	2 (0.8)	Physician
	3 (1.2)	Engineer
	34 (13.6)	Employed
	3 (1.2)	Service work
	18 (7.2)	Self employed
	4 (1.6)	Nurse
Husband's job	1 (0.4)	Unemployed
	1 (0.4)	Physician
	23 (9.2)	Engineer
	74 (29.6)	Employed
	11 (4.4)	Service work
	140 (56)	Self employed
Education	21 (8.4)	Illiterate &
	93 (37.2)	Diploma
	132 (52.8)	Undergraduate & master
	4 (1.6)	Doctorate and postdoc
Address	226 (90.4)	Town
	24 (9.6)	Rural
Gravid	99 (39.6)	1
	151 (60.4)	>1
Para	128 (51.2)	0
	85 (34)	1
	31 (12.4)	2
	6 (2.4)	3
Stillbirth	10 (4)	Yes
	240 (96)	No
Method of delivery in childbirth leading to the death of the baby	4 (40)	Normal delivery
	6 (60)	Caesarean
Abortion	52 (20.8)	Yes
	198 (79.2)	No
PPSH	17 (6.8)	Yes
	233 (93.2)	No
History of psychiatric medication use	6 (2.4)	Yes
	244 (97.6)	No
History of psychiatric hospitalization	1 (0.4)	Yes
	249 (99.6)	No
Desire to give birth	104 (41.6)	Normal delivery
	146 (58.4)	Caesarean

(90%) had no depression, 25 patients (10%) had mild depression, and no moderate or severe depression was reported (Fig. 1).

The severity of depression was normal in 94 (9.4%) and 131 (89.7%) pregnant women who preferred normal delivery and caesarean section, respectively. Mild depression was reported in 10 (9.6%) pregnant women who wished to have a normal delivery and 15 (10.3%) pregnant women who wished to have a caesarean delivery. The difference was not statistically significant, $P=0.864$.

The mean and standard deviation of depression score in mothers who chose normal and caesarean section were 7.33 ± 5.79 and 7.72 ± 6.22, respectively, which was not significantly different, $P=0.614$; therefore, the severity of depression does not affect the choice of delivery method.

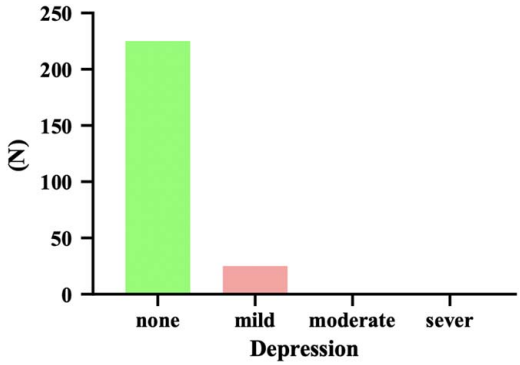

Figure 1. Distribution of depression by severity among pregnant mothers participating in the study.

The mean and standard deviation of the depression score in mothers living in urban and rural areas were 7.56 ± 6.13 and 7.54 ± 5.23, respectively, which was not significantly different, $P=0.990$; therefore, location does not affect the severity of depression in pregnant mothers.

The mean depression scores mothers with undergraduate education, 7.81 ± 6.9, diploma 7.77 ± 6.72, master 7.35 ± 5.49 and doctorate level was 8.0 ± 2.16, which was not significantly different, $P=0.954$; therefore, education level has no effect on the severity of depression in pregnant mothers.

The mean age of mothers who chose normal delivery and caesarean section was 29.13 ± 5.11 years and 31.01 ± 4.85 years, respectively, which shows that the age of mothers who chose caesarean section was significantly higher than the age of mothers who chose normal delivery, $P=0.003$ (Table 2).

The results showed that the tendency to give birth was not significantly related to the education of pregnant mothers ($P=0.458$), mothers' job ($P=0.969$), residence ($P=0.668$), number of pregnancies ($P=0.317$) and delivery leading to abortion ($P=0.907$).

There was no significant relationship between the desire for delivery and delivery leading to infant death ($P=0.201$), the history of depression, anxiety, or other neurological diseases of the pregnant mother ($P=0.971$), and gestational age ($P=0.251$).

The tendency to give birth was not significantly related to the gestational age of mothers. The mean scores of depression in mothers with gestational age of $28\geq$ and <28 was 7.69 ± 5.87 and 7.42 ± 6.22, respectively.

The severity of depression and childbirth leading to abortion in mothers was significant ($P=0.048$) (Table 3). According to the results, the mean score of depression in mothers with childbirth leading to abortion was 9.67 ± 7.67 and in mothers without childbirth leading to abortion was 7 ± 5.60, which shows that in both groups there was no depression, scores were higher in mothers who had an abortion (Table 4).

Table 2

Comparison of the mean age of pregnant mothers in the two methods of natural selection and caesarean section

Desire to give birth		*P*
Normal delivery ($N=104$)	Caesarean ($N=146$)	0.003
29.13 ± 5.11	31.01 ± 4.85	

Table 3

Investigating the relationship between the severity of depression and childbirth leading to abortion in mothers

	Abortion, *N* (%)		
	Yes	No	*P*
Severe depression			
Normal average (none)	43 (82.7)	182 (91.9)	0.048
Mild depression	9 (17.3)	16 (8.1)	

Discussion

The results of our study reported a significant correlation between method of delivery and the average age of mothers and there was a significant correlation between the incidence of depression and history of abortion.

According to the present study, the prevalence of depression in various studies has been reported to be about 10%[15,16]. In a study by Shabangez and his colleagues in Isfahan, with a sample size of 378 pregnant women at 31–34 weeks gestational age, the depression during pregnancy was 26.7, and the rate of elective caesarean section was higher in the non-depressed group[17]. It seems that the difference in sample size and gestational age of mothers in the two studies could be the reason for the differences in depression score. Although the present study did not find a correlation between maternal depression and the type of delivery selected, these results do not negate the need to address maternal mental health. Studies have shown that performing emergency caesarean section in pregnant mothers (depressed or non-depressed) significantly increases the incidence of postpartum depression[18,19].

In addition to the psychological factors involved in the choice of caesarean delivery, depressed pregnant women are exposed to emergency caesarean delivery in terms of other health-related factors such as prevalence of anaemia, diabetes, hypertension, preeclampsia, and preterm delivery[20]. Therefore, it is important to take care of the mental health of pregnant mothers not only because of unreasonable choices but also because of the increase in unwanted caesarean section rates.

In a study conducted by Eva Rydahl and colleagues, the association of age and other demographic parameters were examined where one million Danish women were included. The results showed that increased age of mothers was significantly associated with an increased incidence of caesarean section. Although part of this association was due to increasing health problems due to aging, in mothers in whom health problems did not preclude vaginal delivery, caesarean section was the method of choice for mothers.

The study also showed that the choice of caesarean section for delivery in the first pregnancy was significantly higher than women who experienced second or multiple pregnancies[21].

Table 4

Comparison of the average score of depression in mothers with childbirth leading to abortion in mothers

Childbirth leads to abortion in mothers		*P*
Yes (*N* = 52)	No (*N* = 198)	0.004
9.67 ± 7.16	7 ± 5.60	

Although the results of increasing maternal age and selection of caesarean section in this study were in accordance with the results of our study, in the present study, no relationship was observed between the number of maternal deliveries and the method of selective delivery. Large variations in sample size is likely to contribute significantly to these discrepancies.

In a cohort study, the association of parameters such as the level of education, age and the choice of caesarean section was examined on 757 Brazilian women. The results showed that increasing the age and education of women was significantly associated with the choice of caesarean section[22]. As mentioned in the present study, no significant correlation was observed between the level of education and the choice of delivery method, which in addition to the difference in sample size between the two studies, could be due to cultural differences between the two communities[23].

However, various studies have provided contradictory evidence on the relationship between mothers' education and caesarean section[24]. The two studies in Norway and Italy showed that the lower level of education of mothers is significantly associated with an increase in the rate of elective caesarean delivery[25]. This shows the need for further studies, with a larger sample size in various socio-cultural fields, including mothers' education in relation to a voluntary caesarean section in the country.

Conclusion

According to the results of this study, no significant relationship was found between the prevalence of depression during pregnancy and the choice of delivery method. Most of the women in our study did not have depression, and only it was found that the age of mothers who chose caesarean section was higher and the prevalence of depression in pregnant mothers with a history of miscarriage was significant.

Ethical approval

No animals were used in this research. All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation Shahid University of Medical Sciences(IR.SBMU.MSP.REC.1398.634) , and with the Helsinki Declaration of 1975, as revised in 2013. This study was approved by the Research Ethics Board of Islamic Azad University.

Consent

Informed consent was obtained from the patient and patient's parents/legal guardian for publication and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Source of funding

No funding was secured for this study.

Author contribution

S.N.K.: conceptualized and designed the study, drafted the initial manuscript, and reviewed and revised the manuscript. R.V.: designed the data collection instruments, collected data, carried out the initial analyses, and reviewed and revised the manuscript. S.V. and H.N.: coordinated and supervised data collection, and critically reviewed the manuscript for important intellectual content.

Conflicts of interest disclosure

The authors deny any conflict of interest in any terms or by any means during the study.

Research registry unique identifying number (UIN)

researchregistry9729.

Guarantor

Dr Seyyedeh Neda Kazemi.

Data availability statement

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

Provenance and peer review

Not commissioned, externally peer-reviewed.

References

[1] Farr SL, Jamieson DJ, Rivera HV, *et al*. Risk factors for cesarean delivery among Puerto Rican women. Obstet Gynecol 2007;109:1351–7.
[2] Rafiei M, Ghare MS, Akbari M, *et al*. Prevalence, causes, and complications of cesarean delivery in Iran: a systematic review and meta-analysis. Int J Reprod Biomed 2018;16:221.
[3] Orr ST, Miller CA. Maternal depressive symptoms and the risk of poor pregnancy outcome: review of the literature and preliminary findings. Epidemiol Rev 1995;17:165–71.
[4] Zuckerman B, Amaro H, Bauchner H, *et al*. Depressive symptoms during pregnancy: relationship to poor health behaviors. Am J Obstet Gynecol 1989;160:1107–11.
[5] Bennett HA, Einarson A, Taddio A, *et al*. Prevalence of depression during pregnancy: systematic review. Obstet Gynecol 2004;103: 698–709.
[6] Dietz PM, Williams SB, Callaghan WM, *et al*. Clinically identified maternal depression before, during, and after pregnancies ending in live births. Am J Psychiatry 2007;164:1515–20.
[7] Gaynes BN, Gavin N, Meltzer-Brody S, *et al*. Perinatal depression: Prevalence, screening accuracy, and screening outcomes: Summary, Evidence Report/Technology Assessment: Number 119. AHRQ Publication Number 05-E006-1, February 2005.
[8] Nasreen HE, Pasi HB, Rifin SM, *et al*. Impact of maternal antepartum depressive and anxiety symptoms on birth outcomes and mode of delivery: a prospective cohort study in east and west coasts of Malaysia. BMC Pregnancy Childbirth 2019;19:1.
[9] Kelly RH, Danielsen BH, Golding JM, *et al*. Adequacy of prenatal care among women with psychiatric diagnoses giving birth in California in 1994 and 1995. Psychiatr Serv 1999;50:1584–90.
[10] Marcus SM, Flynn HA, Blow FC, *et al*. Depressive symptoms among pregnant women screened in obstetrics settings. J Womens Health 2003; 12:373–80.
[11] Vigod SN, Wilson CA, Howard LM. Depression in pregnancy. BMJ 2016;352:i1547.
[12] Orr ST, James SA. Blackmore Prince C. Maternal prenatal depressive symptoms and spontaneous preterm births among African-American women in Baltimore, Maryland. Am J Epidemiol 2002;156:797–802.
[13] Smarr KL, Keefer AL. Measures of depression and depressive symptoms: Beck depression Inventory-II (BDI-II), center for epidemiologic studies depression scale (CES-D), geriatric depression scale (GDS), hospital anxiety and depression scale (HADS), and patient health Questionnaire-9 (PHQ-9). Arthritis Care Res 2011;63 (S11):S454–66.
[14] Mathew G, Agha R. for the STROCSS Group. STROCSS 2021: Strengthening the Reporting of cohort, cross-sectional and case-control studies in Surgery. Int J Surg 2021;96:106165.
[15] Pearlstein T. Depression during pregnancy. Best Pract Res Clin Obstet Gynaecol 2015;29:754–64.
[16] Kazemi SN, Vaziri-harami R, Vaziri-harami S, *et al*. Anxiety disorders in pregnant women and its effects on choosing the delivery method. Rev Colombiana Psiquiatría 2023.
[17] Lydon-Rochelle MT, Holt VL, Martin DP. Delivery method and self-reported postpartum general health status among primiparous women. Paediatr Perinat Epidemiol 2001;15:232–40.
[18] Carter FA, Frampton CM, Mulder RT. Cesarean section and postpartum depression: a review of the evidence examining the link. Psychosom Med 2006;68:321–30.
[19] Bansil P, Kuklina EV, Meikle SF, *et al*. Maternal and fetal outcomes among women with depression. J Womens Health 2010;19:329–34.
[20] Rydahl E, Declercq E, Juhl M, *et al*. Cesarean section on a rise—does advanced maternal age explain the increase? A population register-based study. PLoS ONE 2019;14:e0210655.
[21] Faisal-Cury A, Menezes PR, Quayle J, *et al*. The relationship between indicators of socioeconomic status and cesarean section in public hospitals. Rev Saude Publica 2017;51:14.
[22] Cesaroni G, Forastiere F, Perucci CA. Are cesarean deliveries more likely for poorly educated parents? A brief report from Italy. Birth 2008;35: 241–4.
[23] Khademi M, Vaziri-Harami R, Mashadi AM, *et al*. The effectiveness of telephone-based psychological services to COVID-19. Clin Pract Epidemiol Mental Health 2023;19:e174501792307270.
[24] Tollånes MC, Thompson JM, Daltveit AK, *et al*. Cesarean section and maternal education; secular trends in Norway, 1967–2004. Acta Obstet Gynecol Scand 2007;86:840–8.
[25] Vaziri-Harami R, Vaziri-Harami S, Tarom M. Prevalence of anxiety and depression among engineering students consuming cannabis. Ann Med Surg 2022;80:104144.