

Does the Mode of Conception Influence Early Postpartum Depression? A Prospective Comparative Study from South India

Partheeban Muruganandam¹, Deepa Shanmugam², Niranjan Ramachandran³

ABSTRACT

Background: Besides infertility, the treatment associated with it is potentially related to psychological stress to mothers. This study was conducted to know whether the mode of conception has any association with early postpartum depression.

Method: A prospective cohort study was conducted on postnatal mothers at a tertiary care hospital from January to June 2019. The study participants were divided into two groups: postnatal mothers who delivered following spontaneous conception and assisted conception. Basic sociodemographic and obstetric details were collected. Postnatal depression assessment was done at the end of first and sixth week after delivery on all the mothers by using the Edinburgh Postnatal Depression Scale (EPDS)

Results: In total, 110 subjects (55 in each group) were included in the study. The primary outcome measured was the presence of postpartum depression (EPDS score ≥ 10). The mean (\pm SD) age of the participants was 29 ± 6.4 years. The

sociodemographic profiles of the two groups were comparable except for mean age, mode of delivery, socioeconomic status, prepregnancy body mass index—the group differences in these variables were statistically significant ($P \leq 0.05$). There was no significant difference in the EPDS scores at one week or six weeks of postpartum among the two groups. Comparison of EPDS score among the two groups by Fisher's exact test showed that those mothers with a past history of depression were more likely to have postpartum depression immediately after delivery.

Conclusion: Mode of conception was not associated with an increase in postpartum depression among women who underwent infertility treatment.

Keywords: Postpartum depression, infertility, assisted reproductive techniques, mode of conception

Key Messages: Mothers who deliver after successful infertility treatment are not at increased risk for early postpartum depression than mothers who conceived spontaneously.

Globally, around 50 million couples experience infertility, and there is an increasing trend noted in the South Asian population.¹ The treatment for infertility varies from pharmacological induction to assisted reproductive techniques (ART). The availability of ART is limited in certain parts of the world, particularly in developing countries like India.² Many studies have investigated the emotional stress related to infertility.^{3,4} There have been reports of adverse effects on the psychological health of women who receive infertility treatment, including a high state of anxiety and a tendency to develop depression.⁵ Pregnancy after infertility treatment brings increased anxiety and psychological stress to the mother about the outcome of the pregnancy and the care of the precious newborn.⁶ Nevertheless, knowledge on psychological problems that follow after a positive outcome as a result of infertility treatment is limited. With respect to the pa-

¹Dept. of Psychiatry, Aarupadai Veedu Medical College & Hospital, Puducherry, India. ²Dept. of Obstetrics & Gynecology, Aarupadai Veedu Medical College, Puducherry, India. ³Dept. of Community Medicine, Aarupadai Veedu Medical College & Hospital, Puducherry, India.

HOW TO CITE THIS ARTICLE: Muruganandam P, Shanmugam D, Ramachandran N. Does the mode of conception influence early postpartum depression? A prospective comparative study from South India. *Indian J Psychol Med.* 2020;42(6): 525–529

Address for correspondence: Partheeban Muruganandam, Dept. of Psychiatry, Aarupadai Veedu Medical College & Hospital, Puducherry 607402, India. E-mail: doctorpartheeban@gmail.com

Submitted: 20 Jun. 2019
Accepted: 6 Apr. 2020
Published Online: 20 Jul. 2020



Copyright © 2020 Indian Psychiatric Society - South Zonal Branch

Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 License (<http://www.creativecommons.org/licenses/by-nc/4.0/>) which permits non-Commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE and Open Access pages (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

ACCESS THIS ARTICLE ONLINE
Website: journals.sagepub.com/home/szj
DOI: 10.1177/0253717620928439

rental role, women who conceive by in vitro fertilization (IVF) report lower levels of self-esteem and parenting competence than first-time mothers with no history of infertility.⁷ Women who conceive after infertility treatment are prone to complications like pre-eclampsia, multiple births, gestational complications, cesarean birth, and preterm labor.⁸ Gender of the baby adds to the mother's stress in countries like Japan and India due to the prevalent sociocultural beliefs.^{9,10} Limited prospective study is available on the association between the mode of conception and early postnatal depression in women who receive infertility treatment in developing countries.¹¹ This study was conducted to find out whether the mode of conception is associated with early postpartum depression.

Materials and Methods

This prospective cohort study was conducted in the Department of Psychiatry and Obstetrics and Gynecology on postnatal mothers at a tertiary care hospital, Puducherry, from January to June 2019, after getting approval from the Institute Ethical Committee. Subjects were recruited during the first week of the postpartum period by consecutive sampling, after obtaining informed written consent. The study population was divided into two groups.

Group I: Spontaneous conception (SC)—mothers who conceived spontaneously without any medical assistance.

Group II: Assisted conception (AC)—mothers who conceived after infertility treatment like pharmacological assistance (ovulation induction drugs) or ART (IVF, intrauterine insemination).

Matching was done based on their education and employment status. Mothers less than 18 years of age have been excluded from the study. As per the sample size calculation based on the reported prevalence of postpartum depression as 11%¹² with 95% confidence interval (CI) and 5% precision, 150 patients were recruited for the study. Among 150 mothers recruited, only 110 subjects (55 in each group) completed the study.

Assessments were done at first week (after third postpartum day) and sixth week after delivery on all the patients. This included age of mother, education,

occupation, duration of infertility, parity, type of conception, past history of depression treatment, duration of pregnancy, mode of delivery, gender of baby, multiple births, birth weight of baby, partner support (yes, a lot/yes, a little/no) and prepregnancy body mass index (BMI) based on history and clinical records. Edinburgh Postnatal Depression Scale (EPDS) was used to assess postpartum depression in all the patients. Those who screened positive (score ≥ 10) for depression, underwent structured assessment and psychological intervention as part of routine treatment.

Statistical Analysis

Data were analyzed using IBM SPSS v.17 (IBM Corporation, Armonk, NY, USA). Chi-square test was used to analyze the differences between discrete variables, and student's *t*-test to analyze the continuous variables. To investigate the relationship between the mode of

conception and postpartum depressive symptoms and to identify the predictors of depressive symptoms, Fisher's exact test was performed and Bonferroni correction was applied.

Results

The primary outcome measured was the presence of postpartum depression (EPDS score ≥ 10). The AC group included women who had conceived by using pharmacological intervention ($n = 06$ [5.5%]), intrauterine insemination ($n = 3$ [2.7%]), or IVF ($n = 46$ [41.9%]).

Reasons reported by mothers in the AC group who were treated for secondary infertility are as follows: (a) need for a sibling to the first child, (b) prior child was conceived through ART, (c) recurrent demise of children during infancy, and (d) desire to have a child with her second husband.

Among the 110 study participants, 101 (92.0%) were primiparous and 9 (8.2%)

TABLE 1.
Distribution of Sociodemographic Characteristics of Study Participants by Mode of Conception (n = 110)

	Variable	N (%)	Normal Conception Group (55)	Assisted Reproductive Technology (55)	Group Comparisons and P Value
	Age mean (SD)	29 ± 6.4 years	26 ± 4.5	32 ± 6.5	<0.005 ^a
Number of pregnancy	Single	101 (91.8)	53 (96.3)	48 (87.2)	0.08 ^b
	Multi	9 (8.1)	2 (3.6)	7 (12.7)	
Mode of delivery	Vaginal delivery	17 (15.4)	15 (27.2)	2 (3.6)	<0.001 ^c
	LSCS	93 (84.5)	40 (72.7)	53 (96.3)	
Baby gender	Male	51 (46.3)	26 (47.2)	25 (45.4)	0.8 ^c
	Female	59 (53.6)	29 (52.7)	30 (54.5)	
Education	Up to middle school	99 (90)	50 (90.9)	49 (89)	0.7 ^c
	High school and above	11 (10)	5 (9)	6 (11)	
Employment status	Unemployed	87 (79)	44 (80)	43 (78)	0.8 ^c
	Employed	23 (21)	11 (20)	12 (22)	
BMI	<30	92 (83.6)	51 (92.7)	41 (74.5)	0.01 ^b
	>30	18 (16.3)	4 (7.2)	14 (25.4)	
Age group	<30	65 (59)	43 (78)	22 (40)	0.002 ^c
	>30	45 (41)	12 (22)	33 (60)	
Socioeconomic status	Below poverty line	33 (30)	24 (43)	9 (16)	0.002 ^c
	Above poverty line	77 (70)	31 (57)	46 (84)	

^aIndependent student's *t*-test, ^bFischer's exact test, ^cChi-square test.

TABLE 2.

Prevalence of Depressive Symptoms (Edinburgh Postnatal Depression Scale Score ≥ 10) over Time Among the Postpartum Women by the Mode of Conception ($n = 110$)

	Depression	N (%)	Normal Conception 55	Assisted Delivery 55	Group Comparisons and P Values of Chi-Square Test
Immediately after delivery (baseline)	Yes	7 (6.3)	3 (5.4)	4 (7.2)	1.0
	No	103 (93.7)	52 (94.5)	51 (92.7)	
Six weeks follow-up	Yes	8 (7.2)	5 (9)	3 (5.4)	0.7
	No	102 (92.8)	50 (91)	52 (94.6)	

were multiparous. The mean \pm SD age of the participants was 29 ± 6.4 years. The sociodemographic profiles of the two groups were comparable except for mean age, mode of delivery, socioeconomic status, and prepregnancy BMI—the group differences in these variables were statistically significant ($P < 0.05$) (Table 1).

A total of 15 (13.6%) mothers had high EPDS scores (≥ 10) during the postpartum period. Seven (6.3%) mothers (three in SC group and four in AC group) screened positive for depression during the first week of the postpartum period (baseline). Eight (7.2%) mothers (five in SC group and three in AC group) screened positive for depression at six weeks postpartum (follow-up). There was no significant difference in EPDS scores at baseline or six weeks of postpartum among two groups (Table 2). Seven mothers who screened positive for depression underwent psychological intervention and showed improvement in their follow-up assessment.

An exploratory analysis was done using Fisher's exact test and applying Bonferroni correction, for various sociodemographic and obstetric factors like age group, education, employment, prepregnancy BMI, parity, and maternal factors like parity, past history of depression, duration of pregnancy, type of delivery, baby gender, number of pregnancy, birth weight, breastfeeding adequacy, medical morbidity, and partner support.

During the first week of postnatal period, mothers with a past history of depression ($P < 0.003$) were significantly associated with postnatal depression, but none of the factors were significant at six weeks postpartum.

Discussion

Psychological stress during an assisted reproductive treatment has been widely documented in the literature.¹³ However, the question of whether AC is associated with postpartum mental health disorders, particularly postpartum depression, remains to be adequately answered. This was a prospective cohort study with mothers who conceived after infertility treatment as subjects and those who conceived after natural conception as the controls. The problem of follow-up of these patients was overcome by an assessment done during their follow-up for immunization, contraception, or postnatal check-up.

We found, not surprisingly, that the mean age of women who conceived after infertility treatment was significantly higher ($P < 0.005$) compared to the SC group, and the majority of them were from higher socioeconomic status ($P < 0.01$). Similarly, operative delivery was significantly more ($P < 0.001$) in the infertility group, maybe because of the high incidence of obstetric complications and also increased anxiety related to fetal well-being. There was not much difference observed between the two groups with respect to the other demographic variables.

On analysis of the EPDS score among the two groups, a past history of depression was found to be a significant predictor of postpartum depression during the first week, with no significance found at the sixth week. This finding is supported by an earlier study by Fiorella et al., where EPDS score was found high during the third trimester and one week

postpartum but not in the late postpartum period. They hypothesized that mothers who conceived after infertility treatment are more concerned and experience more anxiety and fear related to pregnancy outcome. For this reason, the exacerbation of depressive feelings would tend to persist after childbirth, and the evidence of a healthy baby after delivery may only partly reassure them, and hence, they continue to experience depressive symptoms.¹⁴

In our study, a past history of depression was found to be significantly associated with early postpartum depression, which is in concordance with Australian study.¹⁵

Mori et al. conducted a prospective cohort study with the participants being recruited from 13 Japanese hospitals. Using self-report questionnaires, a total of 2,709 women (response rate: 71.9%) provided longitudinal data at five time points: during their hospital stay and at one, two, four, and six months postpartum. They observed that there was no significant association between the mode of conception and the depressive symptoms at any time point.¹⁶ Similarly, a prospective cohort study done by Jane Fisher among 1,179 women in Australia through telephone interviews and self-report postal questionnaires found no association between mode of conception and postpartum depression.¹⁷ A web-based study conducted by Pietro et al. among 3,823 mothers observed that conception after IVF is not associated with maternal depressive symptoms during pregnancy or postpartum.¹⁸

A systematic review and meta-analysis done by Gressier et al. in high-income countries found no significant association between postpartum depression and medically AC.¹⁹ Our study result is consistent with that of previous studies where the mode of conception did not influence postpartum depression.¹⁶⁻²⁰

In India, boys are preferred over girls, due to the belief that boys can take over the family as a leader contributing to the economic prosperity of the family. Morizummi (2008) found that the majority of the couple had a balance gender preference towards daughter and sons.²¹ The gender of the baby was almost equally distributed in our study (51:59; M:F),

which did not have any influence on the postpartum emotional state of the mother. The mothers who conceived after infertility treatment do not have any gender preference in comparison to naturally conceived mother, as such a baby is precious to them.⁹

In our study, partner support was not significantly influencing the early postpartum depression as the immediate primary caregivers for mothers are better in Indian culture following delivery, whereas it might influence at a later part of the postpartum period where mothers are expected to return to their husband's family.^{16,22} A study done by Tendais et al. found no change in postpartum anxiety score between mothers who conceived spontaneously versus postinfertility treatment group with regard to multiple births of the baby. Our study is consistent with their result.²³

Though other studies found risk factors like multiple pregnancies, maternal complication, emergency caesarean delivery among mothers with postpartum depression.^{22–24} Our study did not find any significance for the above-discussed factors in view of deliveries conducted in a tertiary center with adequate antenatal mental health support, the methodological difference (hospital-based follow-up study with comparison group, assessed by a single interviewer, face to face interview method), less sample size, and early follow-up. Moreover, other studies were done among the general population and patients were followed up to six months, which might influence at a later part of the postpartum period.

To our knowledge, our study is the first Indian study to focus on postpartum depression in mothers who conceived with ART, which are not widely available for the general population in various parts of India. With the increasing rate of ART centers, a study on women's mental health related to infertility treatment is of paramount importance. However, our study had limitations with regard to the small sample size and short duration of follow-up in the postpartum period.

Conclusion

In the present study, conception after infertility treatment by any means is not significantly associated with early

postpartum depression in comparison to mother who conceived spontaneously without any medical assistance. However, further studies can focus more on large sample size, long-term follow-up, and assessment of postpartum depression severity in relation to other factors influencing infertility.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

References

- Mascarenhas MN, Flaxman SR, Boerma T, et al. National, regional, and global trends in infertility prevalence since 1990: a systematic analysis of 277 health surveys. *PLoS Med* 2012; 9(12): e1001356-e.
- Inhorn MC and Patrizio P. Infertility around the globe: new thinking on gender, reproductive technologies and global movements in the 21st century. *Hum Reprod Update* 2015 Jul–Aug; 21(4): 411–426.
- Volgsten H, Skoog Svanberg A, et al. Prevalence of psychiatric disorders in infertile women and men undergoing in vitro fertilization treatment. *Hum Reprod* 2008; 23(9): 2056–2063.
- Bondade S, Iyengar R, Shivakumar B, et al. Intimate partner violence and psychiatric comorbidity in infertile women—a cross-sectional hospital based study. *Indian J Psychol Med* 2018 Nov–Dec; 40(6): 540–546.
- Gourounti K, Anagnostopoulos F, Potamianos G, et al. Perception of control, coping and psychological stress of infertile women undergoing IVF. *Reprod Biomed Online* 2012 Jun; 24(6): 670–679.
- Dornelles LM, MacCallum F, Lopes RC, et al. The experience of pregnancy resulting from assisted reproductive technology (ART) treatment: a qualitative Brazilian study. *Women Birth* 2016 Apr; 29(2): 123–127.
- Hasanpoor-Azghdy SB, Simbar M, and Vedadhir A. The emotional-psychological consequences of infertility among infertile women seeking treatment: results of a qualitative study. *Iran J Reprod Med* 2014; 12(2): 131–138.
- Tarlatzis BC and Grimbizis G. Pregnancy and child outcome after assisted reproduction techniques. *Hum Reprod* 1999 Sep; 14(suppl 1): 231–242.
- Takegata M, Ohashi Y, Lazarus A, et al. Cross-national differences in psychosocial factors of perinatal depression: a systematic review of India and Japan. *Healthcare (Basel)* 2017 Dec 4; 5(4): 91.
- Jain A, Tyagi P, Kaur P, et al. Association of birth of girls with postnatal depression and exclusive breastfeeding: an observational study. *BMJ Open* 2014; 4(6): e003545.
- Upadhyay RP, Chowdhury R, Aslyeh S, et al. Postpartum depression in India: a systematic review and meta-analysis. *Bull World Health Organ* 2017; 95(10): 706–717C.
- Shriraam V, Shah P, Rani M, et al. A community-based study of postpartum depression in rural Southern India. *Indian J Soc Psychiatry* 2019 Jan 1; 35(1): 64–68.
- Williams KE, Marsh WK, and Rasgon NL. Mood disorders and fertility in women: a critical review of the literature and implications for future research. *Hum Reprod Update* 2007 Nov–Dec; 13(6): 607–616.
- Monti F, Agostini F, Fagandini P, et al. Depressive symptoms during late pregnancy and early parenthood following assisted reproductive technology. *Fertil Steril* 2009 Mar; 91(3): 851–857.
- Milgrom J, Gemmill AW, Bilszta JL, et al. Antenatal risk factors for postnatal depression: a large prospective study. *J Affect Disord* 2008 May; 108(1–2): 147–157.
- Mori E, Iwata H, Maehara K, et al. Relationship between the mode of conception and depressive symptoms during the first 6 months post-partum in Japan. *Reprod Med Biol* 2018 Jul; 17(3): 275–282.
- Fisher J, Wynter K, Hammarberg K, et al. Age, mode of conception, health service use and pregnancy health: a prospective cohort study of Australian women. *BMC Pregnancy Childbirth* 2013 April 08; 13(1): 88.
- Gambadauro P, Iliadis S, Brann E, et al. Conception by means of in vitro fertilization is not associated with maternal depressive symptoms during pregnancy or postpartum. *Fertil Steril* 2017 Aug; 108(2): 325–332.
- Gressier F, Letranchant A, Cazes O, et al. Post-partum depressive symptoms and medically assisted conception: a systematic review and meta-analysis. *Hum Reprod* 2015 Nov; 30(11): 2575–2586.
- Listijono DR, Mooney S, and Chapman M. A comparative analysis of postpartum maternal mental health in women following spontaneous or ART conception. *J Psychosom Obstet Gynaecol* 2014 Jun; 35(2): 51–54.

21. Moriizumi R. An empirical study of sex preferences for children in Japan. *J Popul Probl* 2008; 64(1): 1–20.
22. Lee SH, Liu LC, Kuo PC, et al. Postpartum depression and correlated factors in women who received in vitro fertilization treatment. *J Midwifery Womens Health* 2011 Jul–Aug; 56(4): 347–352.
23. Tendais I and Figueiredo B. Parents' anxiety and depression symptoms after successful infertility treatment and spontaneous conception: does singleton/twin pregnancy matter? *Hum Reprod* 2016 Oct; 31(10): 2303–2312.
24. Burgut FT, Bener A, Ghuloum S, et al. A study of postpartum depression and maternal risk factors in Qatar. *J Psychosom Obstet Gynaecol* 2013 Jun; 34(2): 90–97.