Original Article

The Relationship between Maternal Confidence, Infant Temperament, and Postpartum Depression

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Abstract

Background: Although several studies have emphasized the correlation of infant temperament and maternal confidence, this topic has not been explored in different culture and geographical contexts. We study association of maternal confidence, infant temperament, and postpartum depression among postnatal mothers. **Materials and Methods:** This cross-sectional study was conducted at Sriramachandra Institute of Higher Education and Research, India from July 2017 to May 2018. The sample population comprised of mothers at 6 weeks of postnatal period attending the Immunization Clinic. The instruments used were standardized Karitane's Parenting Confidence Scale (KPCS), Bates Infant Characteristics Questionnaire (BICQ), and Edinburgh Postnatal Depression Scale (EPDS). A structured questionnaire was used to collect data from postnatal mothers. Data were analyzed with Statistical Package for the Social Sciences (SPSS) ver. 19, using analysis of variance, correlation coefficient, multivariable regression. **Results:** In this study, 64.40% of the population had high level of confidence and 80% postnatal mothers had no depression. A significant association (t_2 = 18.15, p = 0.001) was seen between maternal confidence, family support, and place of living. Regression analysis showed that confidence of postnatal mothers has a significant influence (t_2 = 12.48, p < 0.005) on infant temperament. **Conclusions:** Two-third of the postnatal mothers had high confidence level with no depression. A positive correlation between postpartum depression and infant temperament was found to be associated with income, parity, and maternal confidence. A significant association was also seen of infant temperament with type of family, income, place of living, and sex of the baby.

Keywords: *Infant temperament, maternal confidence, postnatal mothers, postpartum depression*

Introduction

Pregnancy makes women joyful, elated, and empowered. Preparing to be a mother is one of the most exciting times in a woman's life. During the postpartum period, along with such extreme joy and happiness, emotional changes are also common due to hormonal changes, especially estrogen and progesterone which fall to low levels; pain of the episiotomy or cesarean section adds to the distress of the mother.[1] Although maternal confidence has been found to be associated with several factors, such as premature birth, maternal stress, social support, and infant temperament and mood,[2] the studies were imperfect with limited questionnaires and were confined to a particular population. If available healthcare facilities are below standard, maternal confidence is seen to decrease, giving rise to postnatal stress. Unfortunately, such facilities are still way below standard in low-income and third world countries. Low maternal confidence delays transition into the maternal role; it also limits satisfaction in the mothering role.[1] In United States of America (USA), 68.00% of married mothers balance motherhood with multiple roles including employment.[3] This number can be different in Asian or African countries where mothers' role are mostly confined to household work and have to fill in multiple roles including care giver and cook etc.

A mother acquires confidence by reading the child's signals, while she establishes her own style of parenting through trial and error, and successfully meeting the child's needs.[4] In addition, receiving validation from others regarding one's own style of childcare leads to confidence.[5] These aspects of confidence in child care also depend upon healthcare support; one can be

How to cite this article: JayaSalengia BH, Rajeswari S, Nalini SJ. The relationship between maternal confidence, infant temperament, and postpartum depression. Iranian J Nursing Midwifery Res 2019;24:437-43.

Received: 3 December, 2018. **Revised:** 18 June, 2019. **Accepted:** 25 June, 2019. **Published:** 7 November, 2019.

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Access this article online

Website: www.ijnmrjournal.net

DOI: 10.4103/ijnmr.IJNMR_208_18

Quick Response Code:

fortunate to have the best health care in Western and the Middle East countries where resources are not a constraint, but in low-income countries and third world countries, lack of healthcare infrastructure can bring the morale down for a mother.[5,6]

Infant temperament is distinct by characteristic behavior of the infant. Infants are categorized as having easy or difficult temperament.[6] An infant with difficult personality further impedes the transition, resulting in frustration for new mothers and possibly depression.[7] According to the World Health Organization (WHO), global occurrence of postpartum depression has been estimated as 100–150 per 1000 births.[8] Prevalence of postpartum depression was 12.00% and incidence was 4.40% in a rural community of India.[9] Postpartum depression is observed in 10–20% of mothers, more gradual in onset over the first 4–6 months following delivery; changes in hypothalamic–pituitary–adrenal axis may be a cause and is manifested by loss of energy and appetite, insomnia, social withdrawal, irritability, and even suicidal attitude. The risk of recurrence is high (50–100%) in subsequent pregnancies.[10]

American College of Obstetricians and Gynecology (ACOG)[11] suggested screening patients at least once during the perinatal period for depression and anxiety symptoms using a standardized validated tool because it is important to detect perinatal depression. Recommendations for screening of perinatal depression increase opportunities for intervention, thereby improving outcomes for both mothers and children. Routine screening and treatment for depression should be included in all maternal and child health clinics.[12] As it is evident from earlier research, relationship of maternal confidence, infant temperament, and postpartum depression is dependent not only on family background but also on facilities provided including healthcare which varies significantly in different regions.[4-7] Maternal mental wellbeing influences newborn health which can be studied to develop interventions to strengthen maternal confidence, improve infant outcomes, and prevent postnatal depression. With this view, the investigator has taken up this study to assess maternal confidence, infant temperament, and postpartum depression among postnatal mothers at a tertiary care center, Sri Ramachandra Hospital, Sri Ramachandra Institute of Higher Education and Research (SRIHER), Chennai.

Materials and Methods

The design adopted for the study was cross-sectional to assess maternal confidence, infant temperament, and postpartum depression among postnatal mothers at the medical center of SRIHER, Chennai between July 2017 and May 2018. Accessible population for the study comprised mothers having a baby of 6 weeks, attending the Immunization Clinic of G block at Sri Ramachandra Medical Center, Chennai. It is a multispecialty tertiary care hospital with 2253 beds. Immunization Clinic is part of the pediatric Out Patients Department. About 3100 babies are immunized annually at this hospital. At 6 weeks, around 300 babies are immunized. The immunization service at the outpatient department is offered between Mondays to Sunday 8.00 am to 4.00 pm.

The sample size was calculated using Cochran's formula as per the estimation of proportion rate based on previous studies. The estimated sample size was 146. Confidence level = 95%. For 95% Confidence level Z was 1.96; p (proportions/confidence interval) = 20%; q = 100-p; e = half width of the desired interval. A total of 146 pregnant women, either first time (Primi) or repeated pregnancy (multipara), at 6 weeks of postnatal period attending Immunization Clinic of SRIHER and willing to participate in the study were enrolled for this study. The mothers had delivered a single baby at term and could understand Tamil or English. Mothers and infants with acute illness during the time of data collection were excluded. A detailed schematic diagram for the sampling process and research layout is provided in Figure 1. Convenience sampling technique was used to select samples during the study period. Total 146 mothers at 6 weeks of postnatal period were selected based on the inclusion criteria. The

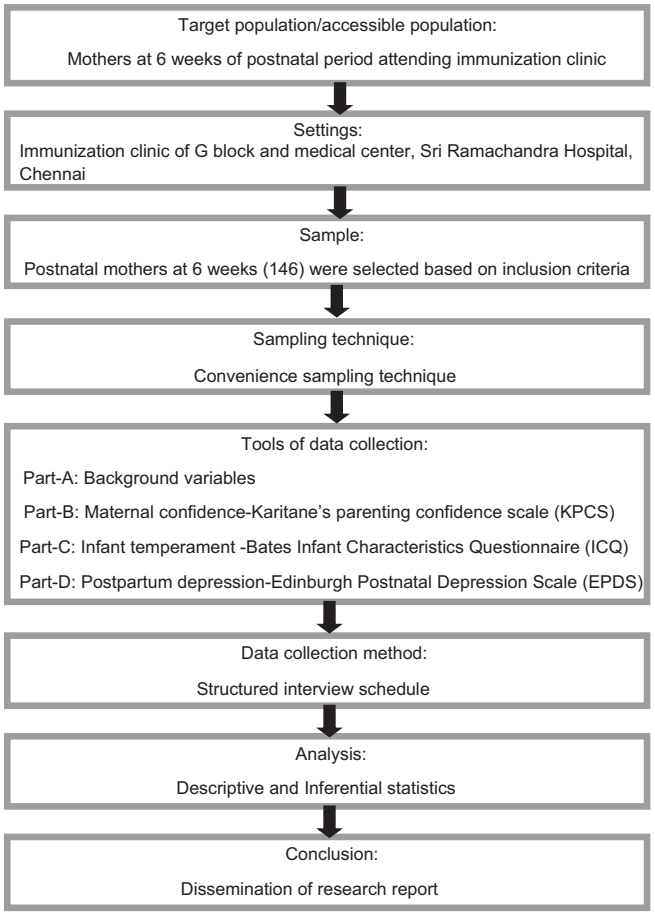

Figure 1: Schematic representation of research design

duration of data collection for the study was 4 weeks that extended from 03.10.2017 to 01.11.2017. The researcher initially established rapport with the study subjects. The mothers were assessed for maternal confidence, infant temperament, and postnatal depression. A total of six to seven subjects were interviewed each day. Each subject was interviewed separately before immunization of baby in the Immunization Clinic. The interview lasted for 30–40 minutes for each subject.

The tool consists of four parts. Part-A: Background variables-It consists of two sections - Section-A: Demographic variables, which has questions about of age, education, occupation, type of family, family monthly income, place of living, social support, source of information; Section -B: Clinical variables consists of nature of pregnancy, parity, risk status, mode of delivery, sex of the baby, sex preference expectation, type of feeding for baby, condition of baby at birth (hypoglycemia, birth asphyxia, meconium aspiration syndrome, babies on antibiotic therapy).

Part-B: Karitane's Parenting Confidence Scale (KPCS): The scale was chosen to measure maternal confidence of postnatal mothers, developed by Črnčec *et al*. (2008).[13] KPCS consists of 15 items on a four-point Likert scale. Each item was rated and scoring was given as 0, 1, 2, and 3; all items are positively scored except item number 12 which is reversely scored. The minimum score is 0, the maximum possible score is 45. The cut-off score of 39 or less is considered as low level of parenting confidence and above 39 is considered as high level of parenting confidence.

Part-C: Infant characteristics questionnaire was developed by Bates (1980).[6] Bates Infant Characteristics Questionnaire (BICQ) was used for evaluating infant's temperament. This scale consists of 23 items with seven-point Likert scale. The scoring is given as 1 to 7; (1 for best and 7 for worst). Question 15 is reverse scored as 7 to 1. The possible responses are categorized under fussy, unadaptable, dull, and unpredictable. Based on Norms of Infant Characteristics Questionnaire, composite scores were created by adding raw scores of items with discriminating loading in factor analysis (Bates *et al*., 1979). The minimum score is 23, the maximum possible score is 161. A higher score indicates a more difficult temperament.[6]

Part-D: The Edinburgh Postnatal Depression Scale (EPDS) was developed at the Scottish health center by Edinburgh and Livingston (1987). It is used to measure postnatal depression. This scale consists of ten items. Response categories consist of ten items on a four-point scale. Questions 1,2, and 4 are scored as 0, 1, 2, and 3 questions 3,5,6,7,8,9,10 are reverse scored 3, 2, 1, and 0. The minimum score is 0 and the maximum score is 30; 10 or greater indicates possible depression.

The English and Tamil version of the tool was validated by experts in the field of Obstetrics and Gynecology, and Nursing. Reliability score of the translated version of the KPCS and BICQ was assessed by test and retest method and the values were $r = 0.81$ and $r = 0.86$. The reliability score for the EPDS was established by the split-half method and the value was $r = 0.94$.

The collected data were analyzed by descriptive statistics (frequency, mean, percentage, and standard deviation) which describe the demographic variables. Inferential statistics, (analysis of variance, correlation coefficient, and multivariable regression), were used. The above characteristics of the data were analyzed using the Statistical Package for Social Science (SPSS, IBM, USA), version 19A; significance level value was considered as $p < 0.05$.

Ethical considerations

Approval (CSP/17/June/59/190) was obtained from the ethics committee as well as from Principal, Chairman IEC, Medical Superintendent of Medical Center and G-block, and Head of Department of Obstetrics and Gynecology on date 17 June 2017. Prior to data collection, the purpose of the study was explained to the mothers and written consent was obtained from all participants. Confidentiality was maintained throughout the study.

Results

The data were collected from 146 postnatal mothers to assess maternal confidence, infant temperament, and postnatal depression. Analysis showed that the majority (60.90%) were in the age group of 18–27 years and 64.40% had studied till graduation. The majority (86.30%) was housewives, joint family (55.50%). Also, 86.30% had planned pregnancy and 57.50% were primiparous. The majority (58.20%) had normal vaginal delivery [Table 1]; 35.60% ($n = 52$) had low level of confidence and 64.40% ($n = 94$) had high level of confidence. The majority (87.00%) of postnatal mothers had no depression and very few of (13.00%) had possible depression. Mean and standard deviation of maternal confidence, infant temperament, and postpartum depression are tabulated in [Table 2].

The present study shows a positive correlation between postpartum depression and infant temperament ($r = 0.058$) without any statistical significance. Regarding the association between maternal confidence and the background variables, the study found that there was a statistically significant association between income ($t_2 = 4.27$, $p = 0.050$), place of living ($t_2 = 2.13$, $p = 0.050$), and parity ($t_2 = 2.57$, $p < 0.005$) and maternal confidence. A positive correlation between postpartum depression and infant temperament ($r = 0.06$) was observed without any statistical significance. A negative correlation between maternal confidence and infant temperament ($r = -0.03$), postpartum depression ($r = 0.08$) was seen without statistical significance [Table 3].

Table 1: Demographic variables and clinical variables of postnatal mothers

Clinical variables	*n* (%)	Maternal confidence			Infant temperament			Postpartum depression			Degree of Freedom (df)
		Mean (SD)	*t*	*p*	Mean (SD)	*t*	*p*	Mean (SD)	*t*	*p*	
Nature for pregnancy											2
Planned	126 (86.33)	39.03 (3.37)	2.58	0.110	75.21 (11.11)	1.35	0.247	7.19 (3.43)	0.04	0.841	
Unplanned	20 (13.72)	37.65 (4.67)			78.4 (13.18)			7.35 (2.13)			
Parity											2
Primiparous	84 (57.53)	38.19 (3.96)	6.78	0.011	76.86 (11.59)	2.21	0.136	7.08 (3.08)	0.30	0.582	
Multiparous	62 (42.52)	39.73 (2.80)			74 (11.07)			7.39 (3.55)			
Risk status											2
Low-risk mother	125 (85.60)	38.93 (3.63)	1.41	0.247	75.54 (11.38)	2.34	0.100	7.23 (3.29)	3.15	0.446	
High-risk mother	21 (14.41)	38.60 (3.16)			75.1 (10.91)			6.70 (2.79)			
Mode of delivery											3
Normal vaginal delivery	85 (58.21)	38.69 (3.52)	1.73	0.163	75.35 (11.02)	1.04	0.377	7.09 (2.82)	2.15	0.096	
Assisted vaginal delivery	5 (3.41)	35.80 (5.93)			84.4 (11.14)			10 (3.6)			
Emergency LSCS	25 (17.22)	39.04 (2.97)			75.76 (12.46)			6.36 (3.14)			
Elective LSCS	31 (21.23)	39.58 (3.67)			74.94 (11.16)			7.77 (4.21)			
Sex of baby											1
Male	76 (52.12)	39.05 (3.85)	0.54	0.463	73.01 (11.62)	8.86	0.003	7.24 (3.51)	0.93	0.006	
Female	70 (47.91)	38.61 (3.28)			78.5 (10.55)			3.03 (1.02)			
Sex preference Expectations											2
Met	58 (39.72)	38.19 (4.08)	1.64	0.198	75.62 (11.69)	0.99	0.010	6.69 (3.65)	1.41	0.247	
Not met	62 (42.54)	39.34 (3.178)			75.76 (11.73)			7.42 (3.04)			
No preference	26 (17.82)	39.12 (3.241)			75.42 (10.42)			7.88 (2.87)			
Condition of baby											1
Stable	140 (95.91)	38.89 (0.3)	0.49	0.484	75.81 (11.42)	0.70	0.406	7.22 (3.32)	0.87	0.030	
Unstable	6 (4.0)	37.83 (1.53)			71.83 (11.82)			7 (2.459)			
Type of feeding											2
Breast feeding	127 (87.67)	38.99 (3.6)	0.58	0.463				7.20 (3.34)	0.98	0.040	
Formula feeding	3 (2.10)	38.33 (7.37)						7.67 (2.52)			
Both breast feeding and formula feeding	15 (10.21)	37.73 (2.73)						7.13 (3.31)			

SD=Standard deviation; LSCS= Lower segment caesarean section

Table 2: Distribution of maternal confidence, infant temperament and postpartum depression among postnatal mothers

Maternal confidence level	Scores	*n* (%)
Low	(0-39)	52 (35.60)
High	(40-45)	94 (64.40)
No depression	(<10)	127 (87.00)
Possible depression	(>10)	19 (13.00)
Maternal confidence	0-45	38.8 (3.59)
Infant temperament - Total	23-161	75.6 (11.42)
Infant temperament -Fussy	6-42	20.2 (3.84)
Infant temperament -Unadaptable	4-28	12.6 (2.86)
Infant temperament -Dull	2-12	3.19 (2.29)
Infant temperament -Unpredictable	3-21	8.96 (2.91)
Postnatal depression	0-30	7.21 (3.28)

There was a significant association between infant temperament and family support (t_2 = 12.48, p = 0.005) and income (t_2 = 2.1, p = 0.006). Presence of a significant association between parity (p = 0.005) and maternal confidence of postnatal mothers was seen. Results also show the presence of a significant association (t_2 = 12.48, p = 0.005) between infant temperament and type of family as well as family monthly income of postnatal mothers. It shows a significant association between infant temperament and sex of the baby (t_2 = 3.12, p = 0.002) [Table 4]. Result reveal a significant association between postpartum depression and occupation (t_2 = 3.88, p = 0.001) of postnatal mothers. Absence of a significant association is indicated between postpartum depression and nature for pregnancy, parity, risk status, mode of delivery, sex of the baby, sex preference of baby, the condition of baby, and type of feeding of postnatal mothers.

Regression analysis showed that income and parity of the postnatal mother have a significant influence on maternal confidence, accounting for the variance of 16.70%. Income and sex of the baby are seen to have significantly influenced infant temperament, accounting for the variance of

10.60%. Postnatal depression is not seen to be significantly influenced by income, place of living, parity, sex of baby, and risk status of postnatal mothers, accounting for the variance of 21.00% [Table 4].

Discussion

The study assesses maternal confidence, infant temperament, and postpartum depression among postnatal mothers at Sri Ramachandra Hospital, Chennai**.** Maternal confidence was assessed which indicated that one third of postnatal mothers had low level of confidence. The study findings were consistent with the study carried out earlier[14] which showed that the confidence of women about child rearing was 140 (67.00%) in Japan and 86 (65.00%) in Vietnam. The present study explored parenting confidence in parents at the time when their newborns are discharged from hospital. Parents who had a planned pregnancy or preterm infants, and whose infants were delivered by cesarean section, required parenting needs and it was more for parents of low birth weight infants. Regarding parenting confidence, multipara parents are perceived to have higher confidence than primiparous parents.

This study showed that the mean score of infant temperament was higher than group average. An earlier study stated that mean score for infant temperament was above average, supporting the finding of our results and was very similar to reports of earlier literature. Conversely, the mean score of infant temperament was interpreted to signify that mothers viewed their infants' personality as normal

Table 3: Correlates the maternal confidence, infant temperament, and postpartum depression among postnatal mothers

Variables	Maternal confidence		Infant temperament		Postnatal depression	
	r	*p*	*r*	*p*	*r*	*p*
Maternal confidence			-0.27	0.742	-0.08	0.361
Infant temperament					0.06	0.487
Postnatal depression						

Table 4: Regression of maternal confidence, infant temperament, and postpartum depression with selected background variables among postnatal mothers

Background variables	Maternal confidence		*t*	*p*	Degree of Freedom (df)
	Unstandardized coefficient				
	Beta	Standard error			
Demographic variables					2
(Constant)	33.71	1.85	18.15	0.001	
Family monthly Income	0.87	0.20	4.27	0.050	
Place of living	0.05	0.41	2.13	0.890	
Clinical variables					2
Parity	1.45	0.56	2.57	0.010	
Sex of baby	-0.58	0.55	-1.05	0.293	
Risk status	-0.66	0.74	-8.99	0.374	
R^2		16.70%			
Infant temperament					
Demographic variables					2
(Constant)	76.41	6.12	12.48	0.005	
Family monthly Income	-1.41	0.67	2.10	0.030	
Place of living	0.36	1.38	0.26	0.792	
Clinical variables					2
Parity	-2.93	1.86	-1.57	0.110	
Sex of baby	5.7	1.82	3.12	0.002	
Risk status	1.42	2.43	0.58	0.561	
R^2		10.60%			
Postpartum depression					
Demographic variables					2
(Constant)	7.15	1.84	3.88	0.001	
Income	-0.28	0.20	-1.39	0.160	
Place of living	0.39	0.41	0.94	0.340	
Clinical variables					2
Parity	0.29	0.56	0.51	0.601	
Sex of baby	-0.06	0.54	-0.11	0.911	
Risk status	0.35	0.73	0.47	0.634	
R^2		21.00%			

as compared to other infants.[6,15] In the present study, as expected, confidence scores were high and depression scores were low. Statistically significant relationships existed between infant temperament and depression, social support, and maternal confidence. The more pleasing the infant's temperament, better was the mother's confidence.

Postpartum depression was assessed by means of the EPDS (1987), which showed that majority of postnatal mothers had no depression and very few had possible depression. The findings were very much in agreement with a study published earlier which showed the prevalence of postpartum depression among women attending postnatal clinic of a teaching hospital that catered to the population of New Delhi and other adjacent states of Northern India to be 15.80%, measured using Prime Major Depressive Disorder Today scale.[1,16]

Similarly, it was found that women at risk for postpartum depression in a tertiary teaching hospital in New Delhi was 31 (6.50%) out of 506 women[17] and it was also identified in a published report which stated the prevalence of postpartum depression to be 17.60% among Arab women at primary healthcare centers of the Supreme Council of Health.[18] A study performed very recently in 2013 showed the highest prevalence rate of postpartum depression among women in Pakistan ranging from 28.00% to 63.00%, ranking it highest in Asia.[19]

This study shows a positive correlation between postpartum depression and infant temperament; it was also found to have a statistically significant association with income, parity, and maternal confidence. A previous study stated that maternal confidence is linked to several factors, including birth of a premature baby, maternal stress, infant temperament, and social support.[2] In a report published in 2016, it was found that maternal confidence was affected by the feeling of being plagued by postpartum routines, requirement of longer time for feeding, and pregnancy with complications.[20] A significant association of infant temperament with type of family, income, place of living, and sex of the baby was observed in this study. The study found a very close association with earlier published reports stating associations of infant temperament with maternal postpartum anxiety and depression during the early postpartum period.[21] The study showed that breastfed newborns established higher vigor as compared to bottle-fed newborns and indicated that children's personality might be an important factor in the conclusion concerning feeding method, similar to one reported before.[22]

The present study identified that postnatal depression has a significant association with occupations and showed that education, delivery mode, only daughter, relationship between mother-in-law and daughter-in-law, and newborn gender satisfaction are risk factors for postpartum depression, as stated earlier.[23] In the multivariate model, factors, such as marital conflict, maternal health, economic burden, stressful life events and previous depression, were independently associated with postpartum depression; being included and sustained with their families was a protective factor from postpartum depression.[24]

Limitation faced during the study was that participants were a diverse group of women, and there was no control over pregnancy outcome and other related complications since they might also be influenced by several other social factors. Another limitation was the weakness of data which is a very basic problem for such studies; that is, collection of data from postnatal mothers at 6 weeks and mothers being mostly hesitant to spend time with questionnaires. Since the number of questions was more (48 and demographic variables), it was not possible to collect data at one point of time and required visiting the participants over the time period. A replication of the present study can be conducted with larger samples size and a comparative study between high risk and low risk, and rural and urban, postnatal mothers can be included. Longitudinal follow-up to assess the impact of maternal confidence, infant temperament, and postpartum depression on mother and infant health can be conducted.

Conclusion

This could be the first study on this topic from our region which would certainly help authorities to develop a base plan to provide knowledge on child care to mothers with newborn babies. Implications drawn from the present study are of vital concern to the health team. In general, during the postnatal period, self-care is neglected by almost all the mothers. It is more so in the psychological components. But psychological health directly influences the well-being of mothers and infants. Hence, initiatives can be taken to screen all postnatal mothers and infants on psychological aspects, and various awareness programs can be implemented to promote psychological health. These activities could prevent psychological problems during the current period as well as in future and thereby promote quality of life.

Acknowledgements

Authors acknowledge the support and help provided by SRIHER, Chennai India (CSP/17/June/59/190).

Financial support and sponsorship

Nil.

Conflicts of interest

Nothing to declare.

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