Original Article

Impact of audio assisted relaxation technique on stress, anxiety and milk output among postpartum mothers of hospitalized neonates: A randomized controlled trial

Suman Dabas[a,*], Poonam Joshi[b], Ramesh Agarwal[a], Raj Kumar Yadav[c], Garima Kachhawa[d]

[a] Department of Pediatrics, All India Institute of Medical Sciences, New Delhi, India
[b] College of Nursing, All India Institute of Medical Sciences, New Delhi, India
[c] Department of Physiology, All India Institute of Medical Sciences, New Delhi, India
[d] Department of Obstetrics and Gynaecology, All India Institute of Medical Sciences, India

ABSTRACT

Despite evidence suggesting use of relaxation technique beneficial for all human beings, it is one of the less commonly used approach for postpartum mothers.

Aim: To assess the impact of relaxation technique on stress, anxiety and milk output among the postpartum mothers of hospitalized neonates in NICU.

Materials and methods: In a non-blinded randomized controlled trial with total enumeration sampling technique, screening of NICU admission was done daily based on inclusion criteria. From total 160 admissions over a period of 6 month, 74 postpartum mothers meet the inclusion criteria whose neonates were born preterm (26–33 weeks gestation) and admitted consecutively to the level-III NICU at AIIMS Hospital in New Delhi, India. Total 57 mothers agree to participate, they were enrolled and randomly assigned to experimental (n_1 = 29) and control (n_2 = 28) groups using a computer generated random allocation sequence. There were total seven dropouts with the final sample size of 25 in each group. Baseline data including socio-demographic profile, maternal stress and anxiety were collected using subject data sheet, standardized Parental Stress Scale (PSS): NICU and Perinatal Anxiety Screening Scale (PASS) on 4 ± 2 postpartum day. An audio assisted relaxation technique of 30 min duration, was developed under the guidance of yoga therapist, which included deep breathing (5 min), Suksham Vyayam (8 min), Anulom-Vilom (5 min), Brahmari (5 min), Progressive Muscle Relaxation (PMR) (5 min), and deep breathing (2 min). The experimental group was administered audio assisted relaxation technique followed by every day practice for 10 days, while the control group continued to receive the routine care. The impact of the relaxation technique on stress, and anxiety of mothers along with milk output was assessed after 10 days of enrolment.

Results: Baseline characteristics and pre-intervention mean maternal stress (3.9 ± 0.5 vs. 3.8 ± 0.5, p = 0.34) and anxiety scores (31.12 ± 11.4 vs. 31.08 ± 12.0, p = 0.99) were comparable in both the groups. There was significant reduction observed in maternal stress (2.9 ± 0.5 vs. 3.6 ± 0.6) and anxiety scores (19.8 ± 6.7 vs. 28.18 ± 11.7, p ≤ 0.05) and improvement in milk output (69.2 ± 19.3 vs. 54.1 ± 22.5, p ≤ 0.05) in experimental group as compared to control group.

Conclusion: Use of relaxation technique may have significant role in reducing maternal stress and anxiety and improving the milk output.

This trial is registered with Clinical Trials Registry India (CTRI/2018/06/014471).

1. Introduction

Every year 27 million babies are born in India accounting for 20% of global births. It is estimated that with a premature birth incidence of 5–18%, 15 million preterm neonates are born globally every year. India holds first position across the world for total premature births of 3.5 million in a year (WHO, 2018).

The neonatal intensive care unit (NICU) experience has been rated as extremely stressful by most of the parents interfering with their normal parenting. The environment of NICU gives very frightening
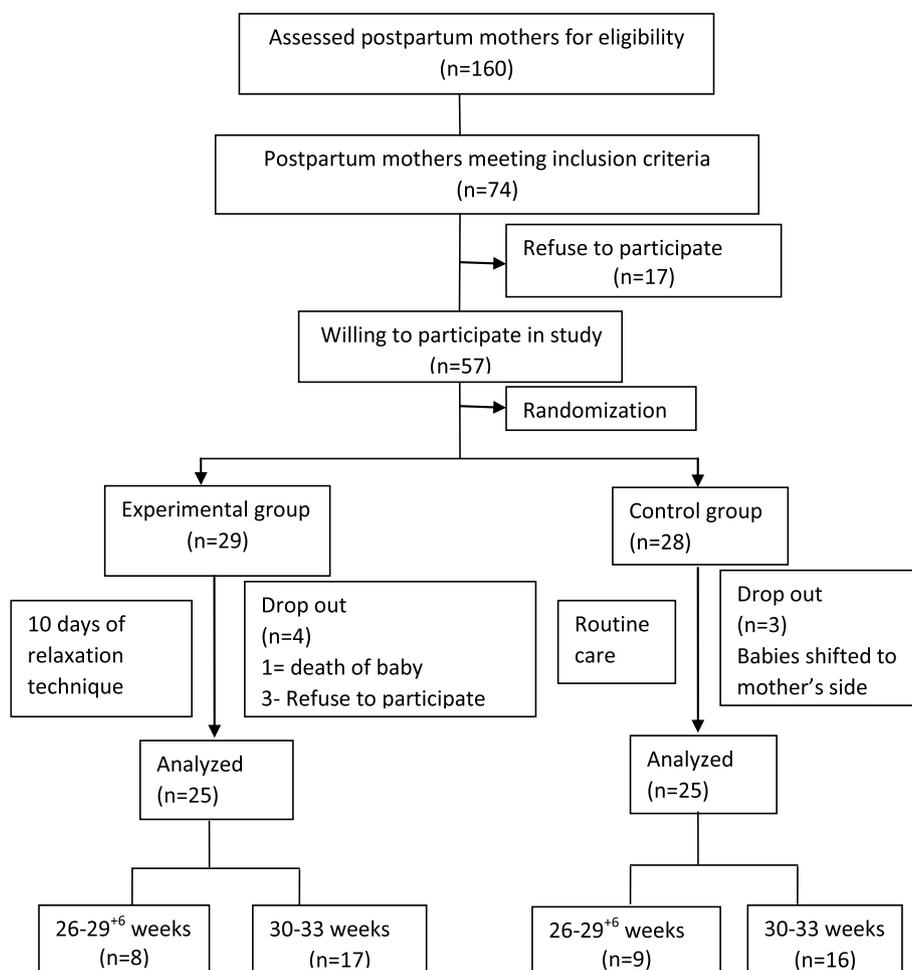
Fig. 1. Consort diagram of study.

experience to a postpartum mother, who plays primary role in NICU after the health care professional (Agrawal and Gaur, 2016). Neonates in the NICU are typically less physically accessible to parents due to monitor leads, feeding and breathing tubes, and incubators, and the NICU environment itself is often experienced as noisy, stressful (Schaffer et al., 2013). The uncertainty about the prognosis of the neonate and his developmental outcome in future may result in difficult mother-neonate bonding and decreased milk output (Miles et al., 1992).

Maternal stress in NICU is often a neglected area and most of care is focused around neonate only (Chourasia et al., 2013). Postpartum mothers have hormonal disruptions and face the challenge of re-incorporating work and other family responsibilities. Maternal stress due to neonates' condition can lead to post-traumatic stress disorder, and postpartum depression among them, further adversely affecting the infant-mother bonding, decreasing breast milk production(Chertok et al., 2014) and in the long run affecting the language development and emotional symptoms in the child (Woodward et al., 2014).

Maternal stress and anxiety related to NICU are of great concern in providing nursing care to sick neonate. Various interventions like education programme, narrative writing, neonates' massage, mother-infant transaction programme, neonates' massage, creating opportunities for parent empowerment model and new born individualized development care and assessment program (NIDCAP) have been executed to lower the stress among postpartum mothers (Kaaresen et al., 2006; van der Pal et al., 2007; Melnyk and Feinstein, 2009; Kadivar et al., 2017). There are number of research based evidences suggesting the importance of relaxation techniques such as progressive muscle relaxation, guided imagery and music-based listening intervention

resulting in increasing the milk output and reducing the anxiety of postpartum mothers in late postpartum period (Schaffer et al., 2013; Keith et al., 2012; Karbandi et al., 2017).

Yoga is a psycho-therapeutic intervention having an effect on physical, mental, emotional and spiritual aspects of the individual in disease and health. It has various positive effects on the general wellbeing of individual in terms of maintenance of autonomic balance, development of hypo-metabolic states, improvement of physical and thermo-regulatory efficiency, increase in cardiopulmonary functions, improved mood states and a tranquil state of mind to combat stress (Satyapriya et al., 2013; Joseph, 1983; Saxena and Saxena, 2009; Ma et al., 2017; Rao et al., 2008). Yoga based relaxation techniques have been found to be effective in reducing trait anxiety in antenatal mother(14) and yielded good results in various medical conditions like bronchial asthma, hypertension, obesity and gastro-intestinal disease (Joseph, 1983; Saxena and Saxena, 2009; Ma et al., 2017; Rao et al., 2008). Till now, no study has been done in early post-partum mothers to reduce stress and anxiety using yoga based relaxation technique. Therefore, researcher felt the need for analysing the effect of relaxation technique consisting of deep breathing, suksham vyayam, anulom-vilom, brahmari and progressive muscle relaxation in early postpartum period. Therefore, the present study was conceptualized to assess the effect of audio assisted relaxation technique on postpartum mothers of hospitalized neonates with 26–33 weeks of gestation in terms of reduction in maternal stress, and anxiety and improvement in milk output.

Table 1a

Socio-demographic characteristics of the postpartum mothers of hospitalized neonates.

Variable(s)		Experimental group n = 25	Control group n = 25	p value[b]
		Frequency (%)	Frequency (%)	
Age[a]		30 ± 3.8	29 ± 3.9	0.07
Marital status	Married	25(100)	25(100)	
	Divorced/separated/widow	0(0.0)	0(0.0)	
Education qualification	Illiterate	1(4)	1(4)	0.47
	Primary	3(12)	3(12)	
	Secondary	2(8)	4(16)	
	Senior Secondary	4(16)	4(16)	
	Graduate and above	15(60)	13(52)	
Occupation	Government Job	3(12)	1(4)	0.27
	Private Job	6(24)	2(8)	
	House wife	16(64)	22(88)	
Type of family	Joint	11(44)	15(60)	0.39
	Nuclear	14(56)	10(40)	
Residential area	Rural	4(16)	9(36)	0.09
	Urban	21(84)	16(64)	
Monthly family income (Rs)	< 10,000	5(20)	11(44)	0.21
	10,001–20,000	9(36)	10(40)	
	20,001–50,000	7(35)	2(8)	
	> 50,000	4(16)	2(8)	

[a]Independent *t*-test, [b] Fisher's Exact test, *p < 0.05.

2. Material and methods

In a non-blinded randomized controlled trial, screening of NICU admission was done daily based on inclusion criteria; postpartum mothers were contacted and enquired about their general health condition by the researcher. After taking informed consent, they were randomized into experimental and control group on 4 ± 2 postpartum day. Total enumeration sampling technique was used as it was MSc. thesis project and maximum period of data collection permitted was 6 months. From total 160 admission over a period of 6 months, 74 postpartum mothers meet inclusion criteria, whose neonates were born preterm (26–33 weeks gestation) and admitted consecutively to the level-III NICU at AIIMS Hospital in New Delhi from 1st June-31st December 2018, meeting the inclusion criteria were contacted; of whom 57 postpartum mothers consented to participate were conveniently enrolled and randomized to experimental (n_1 = 29) and control (n_2 = 28) groups using computer generated random table and opaque sealed envelopes on 4 ± 2 postpartum day. There were total seven dropouts with final sample size of 25 postpartum mothers in each group (Fig. 1). The inclusion criteria for the postpartum mothers with babies delivered at 26–33 weeks of gestation were singleton pregnancy, who could understand either Hindi or English. Mothers with previous NICU experience, having neonates with major congenital anomalies or on any psychotropic drugs were excluded. Ethical clearance was obtained from the institute ethics committee. Written informed consent was taken from the postpartum mothers ensuring the anonymity and confidentiality.

Baseline data collection was done using pre-tested demographic sheet (18 items), and standardized Parental Stress Scale: NICU (PSS: NICU) scale(Miles et al., 1991), and Perinatal Anxiety Screening Scale (PASS) (31 items) (Somerville et al., 2014, 2015). Permission was obtained to use the tools for the study. The PSS: NICU, a standardized self-reported scale (26 items) measured mothers' stress resulting from the appearance and behaviour of the neonates, treatment to baby and alteration in the parental role during the neonatal hospitalization on a 5-point rating scale (ranging from "not at all stressful" to "extremely stressful"). If mother did not experience an item, then NA "not applicable" was encircled. The mean stress scores of mothers in each domain were rounded off to its nearest whole number and classified as low (1–1.9), mild (2–3.9) and severe stress (Miles et al., 1992; Chourasia et al., 2013). Mothers' anxiety was self-rated in four domains namely excessive worry and specific fears (10 items), perfectionism, controlled and trauma (8 items), social anxiety (5 items) and acute anxiety and adjustment (8 items) on a scale ranging from 0 ("not at all") to 3 ("almost always") with possible score of 0–93. The anxiety scores were classified as asymptomatic (0–21), mild-moderate (22–41) and severe symptoms (42–93).

An audio assisted relaxation technique of 30 min duration, developed under the guidance of yoga therapist, which included deep breathing (5 min), Suksham Vyayam (8 min), Anulom-Vilom (5 min), Brahmari (5 min), Progressive Muscle Relaxation (PMR) (5 min), and deep breathing (2 min). Relaxation technique was demonstrated and administered to postpartum mothers of experimental group on the day of enrollment by yoga therapist and researcher. Relaxation technique was played on laptop in a quite isolated room of the postnatal ward between 6:00-6:30 p.m. and postpartum mothers follow the instruction in small group in sitting position on chair under the supervision of researcher for 10 consecutive days. The postnatal mothers were permitted to take light snacks 2 h before the session. They were also requested not to discuss the intervention with any other postpartum mothers admitted in the ward. Compliance of postpartum mothers with relaxation technique was ensured by maintaining a record. During the same period, the control group continued to receive the routine care. They were enquired about practice of any relaxation technique by researcher. No such incidence was reported by the postpartum mothers of control group.

Post-intervention data on maternal stress and anxiety and milk output were collected after 10 days of the enrolment of mothers. The mean milk output was the volume of milk expressed using electric breast pump till the complete emptying of both breasts in 24 hour divided by frequency of milk expression by the mother.

2.1. Data analysis

Data were first coded and then summarized in master data sheet and analysed using STATA 14.0 version and presented in percentage, mean, standard deviation, range (minimum and maximum). The independent *t*-test, paired *t*-test and fisher exact test were used to compare the variables between and within the groups. The level of significance was set at p value < 0.05.

3. Results

The clinical profile of the neonates between the gestational age of 26–33 weeks in terms of gender, birth weight, respiratory status, hemodynamic stability and feeding status is described (Tables 1a and 1b). The demographic profile of the mothers in experimental and control groups were comparable in terms their age, education, occupation, type of family, and monthly income. They were also comparable in terms of gravida, parity, number of living issues, number of abortions, number of still births, type of delivery (p > 0.05). Pre-intervention mean maternal stress and anxiety scores in both the groups were comparable (3.9 ± 0.5 vs. 3.8 ± 0.5, p = 0.34 and 31.12 ± 11.4 vs. 31.08 ± 12.0, p = 0.99). There was significant improvement observed in the mean stress scores of 'postpartum mothers in the experimental group' in the domains of sight & sound, baby look & behaviour, parent role alteration and total stress scores in comparison to control group (3.24 ± 0.7 vs. 2.4 ± 0.4, 4.0 ± 0.7 vs. 3.05 ± 0.7, 4.4 ± 0.4 vs. 3.16 ± 0.7, 3.9 ± 0.5 vs. 2.9 ± 0.5, p ≤ 0.001), however, significant difference in parent role alteration (p ≤ 0.001) was also observed in the control group, which might be due to adaptation and some kind of

Table 1b

Clinical profile of neonates (between gestational age of 26–33 weeks) in NICU.

Variable		Experimental group (n = 25)	Control group n = 25	p value[b]
		f (%)	f (%)	
Gender	Male	13(52)	14(56)	0.77
	Female	12(48)	11(44)	
Birth weight (gm)	< 1000	7(28)	10(40)	0.08
	≥1001	18(72)	15(60)	
Respiratory Status	Room Air	7(28)	5(20)	0.56
	Open tube/ nasal prong	4(16)	5(20)	
	BCPAP	8(32)	12(48)	
	Invasive Mode	6(24)	3(12)	
Hemodynamic stability	Stable	22(88)	22(88)	0.66
	Unstable	3(12)	3(12)	
Feeding Status	NPO	3(12)	3(12)	0.51
	Tube feeding	22(88)	22(88)	

[b]Fisher's Exact test, *p < 0.05.

coping strategies used by the postpartum mothers in the control group as well (Tables 2a and b). Significant improvement in the mean anxiety scores of postpartum mothers in experimental group was observed as compared to control group (19.8 ± 6.7 vs. 28.18 ± 11.7, $p \leq 0.05$) following the intervention. Similarly within the experimental group a significant reduction in the mean anxiety scores (31.12 ± 11.4 vs.19.8 ± 6.7, p = 0.001) was observed following the intervention (Table 3). Statistically significant difference in milk output of postpartum mothers of experimental and control group (69.2 ± 19.3 vs. 54.1 ± 22.5, $p \leq 0.01$) was also observed (Table 4).

4. Discussion

Major findings of the study reveal that there was significant reduction in stress and anxiety scores and improvement in the milk output in postpartum mothers of the experimental group.

Stress in postpartum mothers, in NICU setting is usually neglected and more attention is focussed on the management of sick hospitalized neonate, especially if the neonate is less than 33 weeks. Various concerns like infant survival and health condition, the neonate's fragile appearance, separation from the neonate, and loss of the anticipated maternal role causes different level of stress in postpartum mothers (Agrawal and Gaur, 2016; Chourasia et al., 2013; Franck et al., 2005; Carter et al., 2007; Ionio et al., 2016; Holditch-Davis et al., 2009; Redshaw, 2005; Fotiou et al., 2016). Appearance of neonate with multiple invasive lines and repeatedly activating visual and auditory alarms of equipment induce anxiety in postpartum mothers. Further uncertainty about neonate survival and prognosis exaggerate anxiety in postpartum mothers of hospitalized neonates. Mothers with premature infants perceive a variable degree of mental stress (Holditch-Davis et al., 2003). We found similar results in the present study; half of the postpartum mothers had severe stress and moderate anxiety symptoms due to parental role alteration, looks and behaviour of the baby.

Many studies have advocated for the use of various intervention

Table 2b

Maternal stress scores of postpartum mothers in experimental and control groups before and after the intervention.

PSS:NICU	Experimental group (n = 25)	Control group (n = 25)	p value[a]
Pre-test	3.9 ± 0.5	3.8 ± 0.5	0.34
Post-test	2.9 ± 0.5	3.6 ± 0.6	0.003*
p value[c]	0.001*	0.07	

[a]Independent *t*-test, [c] paired *t*-test, *p < 0.05.

Table 3

Mean anxiety scores of postpartum mothers in experimental and control groups before and after the intervention.

PASS	Experimental group n = 25	Control group n = 25	p value[a]
Pre-test	31.12 ± 11.4	31.08 ± 12.0	0.99
Post-test	19.8 ± 6.7	28.18 ± 11.7	0.003*
p value[c]	0.001*	0.30	

[a] Independent *t*-test, [c] Paired *t*-test, *p < 0.05.

Table 4

Milk output among postpartum mothers of hospitalized neonates after 10 days of enrollment in experimental and control group.

	Experimental group (n = 25)	Control group (n = 25)	p value[a]
Milk output mL (mean ± SD)	69.2 ± 19.3	54.1 ± 22.5	0.01*

*p < 0.05, [a]Independent *t*-test.

including orientation programme, narrative writing, counselling, progressive muscle relaxation, yoga based therapies in relieving stress and anxiety in postpartum mothers (Fotiou et al., 2016; Ahn and Kim, 2007; Valizadeh et al., 2016; Turan et al., 2008; Manzoni et al., 2008; Timlin and Simpson, 2017; Preyde and Ardal, 2003; Javnbakht et al., 2009; Osman et al., 2014). In the present study, yoga assisted relaxation technique was found to be effective in reducing stress and anxiety of the postpartum mothers of experimental group and improving the milk output in them.

Stress and anxiety experienced by postpartum mothers of hospitalized neonates have adverse impact on oxytocin and prolactin reflex which are normally required for establishment of lactation (Lau, 2001). Preterm mothers are 3 times more at risk of not producing adequate milk than in term mothers (Hill et al., 2005). In the present study, audio assisted relaxation technique had helped the mothers in increasing their milk output, which is congruent with the various studies in which music therapy, progressive muscle relaxation and yoga therapy also led to increase in milk output (Keith et al., 2012; Karbandi et al., 2017; Wildan and Primasari, 2017).

Administration of standardized audio-assisted relaxation technique by yoga therapist and trained researcher in small group and the use of standardized tools and allowance of one to one interaction with the postpartum mothers are strengths of the study. However, the small sample size, single centre and non-blinded study limit the generalizability of our study findings. Due to small sample size, we could not

Table 2a

Stress scores of postpartum mothers in experimental and control groups before and after the intervention.

PSS:NICU Domain	Pre (mean ± SD)	Post test (mean ± SD)	p value[a]	Pre (mean ± SD)	Post test (mean ± SD)	p value[a]
Sight & sound domain	3.24 ± 0.7	2.4 ± 0.4	0.001*	3.0 ± 0.9	3.0 ± 0.5	0.59
Baby look & behaviour	4.0 ± 0.7	3.05 ± 0.7	0.001*	3.9 ± 0.6	3.8 ± 0.6	0.24
Parent role alteration	4.4 ± 0.4	3.16 ± 0.7	0.001*	4.4 ± 0.5	3.9 ± 0.6	0.001*
Total stress score	3.9 ± 0.5	2.9 ± 0.5	0.001*	3.8 ± 0.5	3.6 ± 0.6	0.07

[a]Independent *t*-test, *p < 0.05.

do the sub-group analysis in postpartum mothers of preterm and very preterm neonates. The possibility of contamination between the experimental and control group cannot be ruled out in the present study. Post-intervention follow-up could not be done due to time constraints. After the completion of intervention, mothers of experimental group were encouraged to continue the practice, while interested mothers from the control group were sensitized with the relaxation technique and made to practice the relaxation technique.

4.1. Clinical implication

This study highlights the need for early identification and addressing to the stress and anxiety among the postpartum mothers of preterm neonates. Audio-assisted relaxation technique should be used routinely for the postpartum mothers of hospitalized neonates on day to day basis to reduce their stress and anxiety. Nurses working in the NICU can be prepared to help the postpartum mothers in overcoming their stress and anxiety.

5. Conclusion

Use of audio-assisted relaxation technique may reduced maternal stress and anxiety, and helped in improving the milk output. Hence, can be considered as an integral part of neonatal care in NICU.

Conflicts of interest

None.

Role of funding source

None.

Disclaimer

Permission has been obtained to conduct research from ethical committee, AIIMS. Permission has been obtained to use tools from their respective authors. This has been certified that all authors have seen and approved the final version of manuscript being submitted.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jnn.2019.03.004.

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