ORIGINAL RESEARCH

Effects of perinatal meditation on pregnant Chinese women in Hong Kong: A randomized controlled trial

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Abstract

Objective: To assess the effects of Perinatal Meditation on pregnant Chinese women in Hong Kong.

Design: A prospective longitudinal randomized control quantitative study. Data were collected using the Prenatal Distress Questionnaire, Prenatal Coping Inventory, Edinburgh Postnatal Depression Scale, Body-Mind-Spirit Well-Being Inventory (BMSWBI) and salivary cortisol. Data were collected during first visit, 36th weeks pregnant, 5^{th} weeks and 5^{th} months after delivery.

Settings: Perinatal meditation program (Eastern Based Meditative Intervention, EBMI) for pregnant Chinese women in Hong Kong who were attending the hospital clinic for routine perinatal care.

Participants: 64 pregnant Chinese women were recruited for intervention and 59 were for control. 36 cases were classified as Frequent Practice (FP) in intervention group.

Results: Quantitative results showed statistically significant increase in positive appraisal ($p < .05$) at 36th weeks, difference in evening salivary cortisol ($p < .05$) and decreased in physical distress ($p < .05$) at 5^{th} weeks postpartum in the Frequent Practice (FP) group.

Conclusions: Frequency of practice of meditation is directly related to its effects. Perinatal meditation can help pregnant women to reduce perinatal stress through its effect on coping mechanism and improves physical discomfort in postnatal period which are risk factors for maternal health, fetal health and child health. Perinatal meditation can be added into present perinatal counselling and perinatal program to promote maternal health, child health and family health.

Key Words: Coping, Meditation, Physical distress, Pregnancy stress, Maternal health, Fetal health, Child health, Prenatal care, Postnatal care, Program evaluation

1 Introduction

Transition to motherhood is a time of psychological stress together with physical discomforts that poses critical adaptation challenges.[1,2] Estimates of the prevalence of antenatal psychological distress in pregnant women in industrialized countries are between 8% and 24%.[3–5] Woods *et al.*[6] reported that antenatal psychosocial stress is common, and high levels are associated with maternal factors

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known to contribute to poor pregnancy outcomes. Recent information has found that even minor aliments during pregnancy may have psychosocial factors.[7–9] Perinatal stress is well known as an independent risk factor for adverse pregnancy outcomes and affects maternal health, infant health and child health.[1,6,10–16]

Stress in pregnant women, coupled with the use of less effective coping strategies, has been associated with poorer maternal well-being, including depression and anxiety.[17–20] Pregnant women with high stress and anxiety levels are at increased risk for spontaneous abortion and asymmetric growth retardation.[21–24] Pregnancy-specific stress contributed directly to preterm delivery.[11,21,23,25–29] A decline in stress response during pregnancy may help to protect mother and foetus from adverse influences associated with preterm birth.[30]

During exposure to a stressor, the whole system of stress regulation, consisting of the hypothalamus pituitary adrenal cortex system (HPA axis) and the sympathetic nervous system–adrenal medulla system, is activated. Various hormones, including CRH, adrenocorticotropin-releasing hormone (ACTH), cortisol, and noradrenaline, are released in large quantities into the systemic circulation.[14,31–33] Weinstock[33] reviewed that excess circulating maternal stress hormones alter the programming of foetal neurons, and together with genetic factors, the postnatal environment and quality of maternal attention, determine the behaviour of the offspring. Christian[11] found that stress-induced immune dysregulation during pregnancy has unique implications for both maternal and fetal health. Prenatal stress has been linked to adverse effects in her child.[10] O'Donnell *et al*.[34] found that prenatal maternal mood is associated with altered diurnal cortisol in adolescence. The adverse effects appear to extend into the adolescence and adulthood of the offspring of prenatally stressed mothers, leading to altered neuro-behavioural development, childhood and adolescent mental and physical health problems.[35–54] Maternal life stress events in pregnancy linked to children's school achievement even at age 10 years.[50,55] Multiple clinical studies have, in fact, repeatedly confirmed that prenatal maternal stress are pivotal in shaping behavioural and cognitive impairments in off-spring.[56]

Women's physical and emotional self-rated health is affected negatively by pregnancy during first year of motherhood.[58] The early postal period is considered a vulnerable time for the mother and the family, as they are confronted with the demands of caring for their infant and the physical, emotional and social changes.[59,60] Postnatal mental disorders are associated with underweight, stunting and impaired social and cognitive development in children.[61,62] Maternal depression during perinatal period and early childhood may lead to poor physical health in early childhood and affects young adults' social functioning and mental health.[63] Maternal anxiety levels have relationship with postnatal fatigue.[64] Ongoing postnatal fatigue has been associated with development of maternal depression, early cessation of breast feeding and lower infant developmental performance.[65–67]

The major advance in caring for pregnant women in past decades has been the development of antenatal and postnatal care systems but only some of them have psychosocial intervention for women empowerment.[59,68–85] Meditation is proven to be an excellent adjunctive treatment for many diseases.[86–94] It is worthwhile to have more information about the effects of meditative intervention on perinatal women's health.[95–103] The main objective of this study is to examine the effects of perinatal meditation on pregnant Chinese women in Hong Kong. The author has developed an Eastern based meditative intervention (EBMI) for pregnant Chinese women in Hong Kong.[104] The theoretical background of EBMI bases on the integration of mindfulness practice, the Four Immeasurables, cognitive therapies and Western psychology and psychotherapy. The characteristic of EBMI is that through meditative practice, we can have right awareness, change our mental process, train and transform our mind. EBMI improves the capacity for recognizing and solving problems.[105] EBMI included strategies that aimed at increasing awareness of the effect of stress, coping with stressful situation,[99] increase positive thinking and pleasant activities, improving self-esteem, increasing self-care and learning skills to increase social support, and identifying and exploring unrealistic expectations about pregnancy and motherhood. EBMI for antenatal classes works in line with the theory of salutogenic theory sense of coherence (SOC)[106–109] which enhances the comprehensibility, manageability and meaningfulness of life of pregnant women. EBMI focused on training participants in restructuring skills and techniques for identifying and modifying irrational thoughts that may affect their mental health in the perinatal period. Participants were asked to focus on cultivation of positive emotion and aware of their strengths to overcome negative thoughts through meditative practice. The programme emphasizes on self-discipline and self-directed coping.[110] The effects of the EBMI are consistent with Rosenbaum's view[111] of the beneficial effects of learned resourcefulness on individual's psychological well-being under stressful encounters. The acceptability of EBMI based on the chance of practice on daily basis and incorporates into the daily activities of the participants.[112,113] EBMI is trans-cultural and suitable for individuals of diverse faiths.[114] The intervention was delivered in a group format. Contents of EBMI were listed in Table 1. Figure 1 summarized the benefits of EBMI for pregnant Chinese women.

2 Method

Participants were pregnant Chinese women who attended private obstetrician clinics and antenatal clinics of Queen

Elizabeth Hospital in Hong Kong (2007-2009). The present research had chosen one of the most common types of non-probability sample called convenience sample method. Chosen from a particular date onwards; any pregnant women who attended the clinics with maturity around twelve week to 28th week were invited to take part in the research. Sample size was based on statistical calculation. Participants were randomized placed into two groups, the intervention group and the control group. The intervention groups had six sessions which comprised of the elements of EBMI conducted by the researcher. The control group had only one session and was the introductory lecture for the intervention group without the elements of intervention.

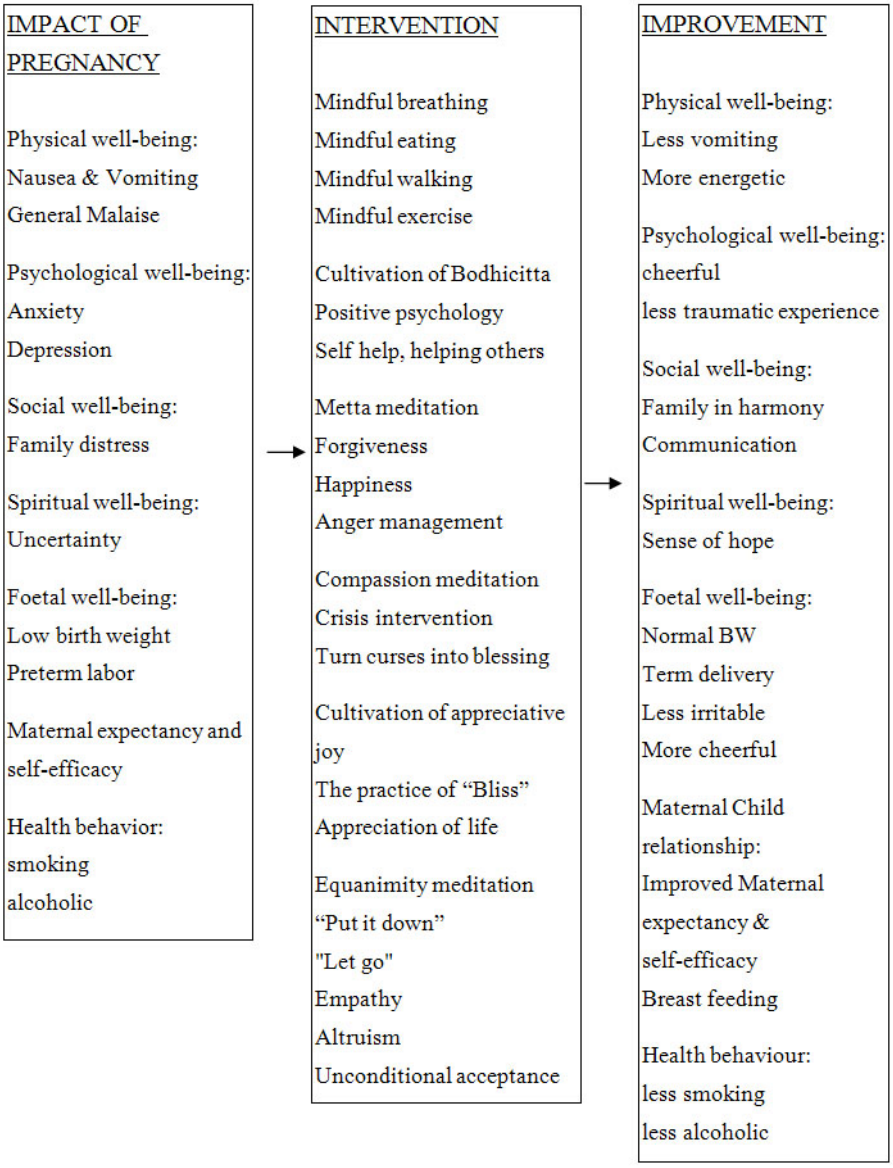

Figure 1: Intended benefits of EBMI for pregnant Chinese women.

All participants that took part in the study had a detailed history taking during the first visit. The demographic and obstetric questionnaires were developed by the researcher in lay-Persian to gather information on the participants' age, gestational age, lifestyle status, financial condition, employment, educational situation, obstetric history, medical history and spiritual history. The participants filled in their first questionnaire chosen, the Prenatal Distress Questionnaire,[115] the Prenatal Coping Inventory,[115] Edinburgh Postnatal Depression Scale (EPDS) and the Body-Mind-Spirit Well-Being Inventory (BMSWBI)[116] during their first visit. The pregnant women were instructed to check their first salivary cortisol levels. They were asked to collect saliva samples at wake-up and before bedtime on

the same day. Second salivary cortisol level and second questionnaire study were taken around 36th week. Third questionnaire study with Edinburgh Postnatal Depression Scale (EPDS) and the Body-Mind-Spirit Well-Being Inventory (BMSWBI) were taken around fifth week after delivery. Fourth questionnaire study with Body-Mind-Spirit Well-Being Inventory (BMSWBI) was taken around fifth month after delivery. All participants had the salivary cortisol samples taken at fifth week and fifth month after delivery.

Table 1: Contents of EBMI.

Contents of EBMI
Mindful eating
Mindful walking
Mindful prenatal and postnatal exercises
Daily practice of 'self-help, helping others'
Crisis intervention: turn curse into blessing
Daily practice of 'bliss'
Let go
Three minutes-breathing practice
Body scan
Mindful breathing
Four Immeasurables Meditation

The Prenatal Distress Questionnaire was chosen as one of the instruments to be used in this study. Descriptive studies indicate that by mid- pregnancy, women often become concerned about medical problems, physical symptoms, parenting, relationships, bodily changes, labour and delivery and the health of the baby. Based on the relevant literatures, a 12-item instrument pertaining to these concerns was created.[115] The Prenatal Coping Inventory was chosen as another instrument for this study which aims to assess worries and concerns related to pregnancy.[117] Standard versions of coping instruments[118,119] cannot fully capture the situational-specific ways in which women may manage the strains and challenges of being pregnant and contain some items inappropriate for this population. The Edinburgh Postnatal Depression Scale (EPDS) was chosen in present study to screen out suspected cases for referral and treatment. EPDS has been used in antenatal to detect current illness although further work is required on the effects on its sensitivity and specificity.[120–122] Total scale scores ranged from 0 to 30, with scores exceeding twelve indicative of depression. The advantage of the EPDS is that it removes items related to physical symptoms of depression (e.g., appetite) that may be affected by the postpartum recovery period itself rather than mood. Chan, *et al.*[123] had conducted a qualitative study of the experiences of a group of Hong Kong Chinese women suffered from postnatal depression. This study confirms the value of using Edinburgh Postnatal Depression Scale (EPDS) as a screening tool for PND in Chinese. The Body-Mind-Spirit Well-Being Inventory (BMSWBI)[116] developed by the Centre on Behavioural Health, University of Hong Kong was chosen as an instrument to assess general well-being. This scale contains four subscales: Symptoms of distress, Emotion, Social Functioning and Spirituality. This inventory was used in this study because of its suitability to Chinese culture and the idea of holistic health.

Various studies use maternal salivary cortisol as measurements of mental health.[31,32,124,125] In present study, salivary samples were collected at wake-up and bedtime (30 min before going to bed) into pre-labelled Salivette tubes (Starstedt, Ag & Co., Nümbrecht, Germany) and immediately frozen until assay. The salivary cortisol level was determined by using an enzyme-linked immunoabsorbent assay kit (EIA) in the Centre on Behaviour Health at the University of Hong Kong (Salimetrics, Inc., State College, PA, USA). The assay sensitivity for the kit was 0.007 g/dl. Intra-assay and inter-assay coefficients of variation were 3% and 10%, respectively.

Data collected from questionnaires went through the process of coding. Descriptive statistics were used to summarize data. Chi-square analysis and independent t - tests were used to detect any significant differences between two groups on the baseline variables.

Ethical approval

The author declared that the research is the original work of the author. The research was approved by the Research Ethics Committee (Kowloon Central/ Kowloon East), Hospital Authority of Hong Kong (2007).

3 Results

There are total 179 cases recruited for both intervention and control groups. Data collection was completed in October 2009. 64 cases have valid data from intervention group while 59 cases with valid data from control groups (see Table 2). Statistical analysis was done along different time zones (see Table 3). With data available about the frequency of practice of EBMI in intervention group at T2 and T3, present study divides this group into two subgroups, those with Frequent Practice (FP) and not Frequent Practice (Not FP). The criterion was based on a five point score (0,1,2,3,4) on five items of EBMI. The five items included self-help, helping others, turn curse into blessing, bliss, let go and mindful breathing. They were chosen because they are frequently practised by the participants. Those who scored more than ten were labelled as Frequent Practice (FP) (n =

36) and those who scored equal to or less than ten were not Frequent Practice (Not FP) (n = 22) (see Table 4). Statistical analysis was done along different time zones for intervention and control groups, between FP group and control group and FP and Not FP group.

The demographic characteristics of the intervention group and control groups reveal no significant difference (see Table 5). The demographic characteristics of the intervention group and control groups reveals no significant difference in age, age of husband, education level, and financial situation, habit of doing exercise before pregnancy, personal habit and past health. 79.7% of participants in the intervention group and 71.4% in the control group are primigravida. It is interesting to note that most of the multiparous patients attend the intervention group are with past history of vaginal deliveries (93.5%) which is statistical significant ($p < .05$) in compare with those in the control group (80.4%). All participants have no past history of obstetric complications.

The comparison of Pregnancy Distress Score at T1 and T2 between intervention group and control group, FP and control group and FP and Not FP group are not of statistical significance. Results of comparison of Prenatal Coping Inventory at T1 and T2 between intervention group, FP group and control group, FP group and Not FP group were shown in Table 6. Analysis of Prenatal Coping Inventory revealed that there are differences in seeking social support and self-care between intervention and control group and FP and Control group at T1 and T2. The score on positive appraisal is increased for FP group as compare to Control at T2 ($p < .05$). The increase in positive appraisal between FP and Not FP at T2 is also of statistical significant ($p < .05$). Results of EPDS for intervention and control group, FP and control group and FP and Not FP group at T1, T2 and T3 are shown in Table 7. The differences are not of statistical significant. The differences between four sub-scores and the total score of BMSWI between intervention group and control group at T1, T2, T3 and T4 are not of statistical significant. The score on physical distress between FP and control group at T3 is of statistical significant ($p < .05$) (see Table 8). Some patients did not return the questionnaires or fill in the questions asked and lead to lot of missing data. Results of maternal salivary cortisol level at different Time Zone of intervention and control group, FP and control group were shown in Table 9. The difference in evening salivary cortisol at T3 between FP and control group is of statistical significant ($p < .05$). Some patients did not return the salivary samples and lead to lot of missing data.

4 Discussion

Meditative practices have received much attention and have stimulated lots of scientific studies.[126–150, 152–156] Meditation may lead to improvements in attention stability, sustained response inhibition, information processing efficiency, alerting, emotional expression and the increase of self-maturity.[86, 157–159] Evidence suggests that meditation as an intervention has a strong relationship to positive health outcomes, overall well-being and adjunctive treatment for diseases.[86, 87, 92, 94, 159–187] Dasari & Kodenchery[25] found that transcendental meditation and sequential muscle relaxation along with tocolytics were found to be more effective in inhibiting preterm labour and prolonging pregnancy than tocolysis alone. Beddoe *et al.*[188] examined the effect of mindful yoga on pregnant women and found that there is decreased total number of awakenings at night and sleep efficiency in second trimester is improved. Duncan & Bardacke[189] did a pilot study of (n = 27) pregnant women participating in Mindfulness-Based Childbirth and Parenting (MBCP) program during their third trimester of pregnancy. MBCP is designed to promote family health and well-being through the practice of mindfulness during pregnancy, childbirth and early parenting.

Table 2: Validity of data from participants.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Control group	56	31.3	31.3	31.3
	Intervention group	64	35.8	35.8	67.0
	Excluded (missing data)	59	33.0	33.0	100.0
	Total	179	100.0	100.0	

Table 3: Validity of data from Time Zone for Data analysis

Time Zone for Data analysis	
T1	Baseline
T2	Around 36th week gestation
T3	Around 5th week postpartum
T4	Around 5th month after delivery

Table 4: No of patients with frequent practice (FP) of EBMI

Items	N
Frequent practice of EBMI (FP)	36
Not frequent practice of EBMI (Not FP)	22
Missing data	6
Total no of patients in intervention group	64

Table 5: Demographic data between intervention and control groups

	Intervention group (n = 64)	Control group (n = 56)	*p*
	Mean (SD)	Mean (SD)	
Age of pregnant	33.34 (4.11)	33.84 (3.74)	.496
Age of husband	36.77 (5.67)	36.66 (5.41)	.915
Education			
Middle school or below	5 (7.9%)	8 (14.5%)	.428
High school	20 (31.7%)	19 (34.5%)	
College or above	38 (60.3%)	28 (50.9%)	
Employment			
Full-time	56 (87.5%)	44 (80%)	.507
Part-time	3 (4.7%)	5 (9.1%)	
Housewife	5 (7.8%)	6 (10.9%)	
Do exercise			
No	6 (9.5%)	12 (22.6%)	.151
Seldom	47 (74.6%)	34 (64.2%)	
Often	10 (15.9%)	7 (13.2%)	
Habit			
Smoker	1 (1.7%)	1 (1.9%)	.680
Non-smoker	56 (93.3%)	50 (96.2%)	
Second-hand smoker	3 (5%)	1 (1.9%)	
Past Health			
No chronic disease	41 (68.3%)	37 (74.0%)	
Surgery	14 (23.3%)	12 (24.0%)	.591
Chronic disease	2 (3.3%)	1 (1.2%)	
Psychiatric disease	2 (3.3%)	0	
Sexual abuse at childhood	1 (1.7%)	0	
Obstetric History			
Para 0			
Para 1	51 (79.7%)	40 (71.4%)	
Para 2 or above	12 (18.8%)	10 (17.9%)	.102
Previous CS*	1 (1.6%)	6 (10.7%)	
0			
= > 1			
Past history of obstetric complications			Nil
Present history of obstetric complications	0	0	
Yes	2 (3.1%)	0	.498
No	62 (96.9%)	56 (100%)	
Having pets at home			
Yes	13 (21.3%)	7 (13.5%)	0.276
No	48 (78.7%)	45 (86.5%)	
Planned pregnancy			
Yes	56 (87.5%)	40 (74.1%)	.062
No	8 (12.5%)	14 (25.9%)	
Abuse during pregnancy			
Yes	0	1 (2.0%)	.262
No	61 (100%)	48 (98.0%)	
Religion/Spirituality			
Yes	37 (58.7%)	27 (49.1%)	.294
No	26 (41.3%)	28 (50.9%)	
Familial disease			
Yes	23 (40.4%)	19 (34.5%)	.526
No	34 (59.6%)	36 (65.5%)	

[ ] = no of missing data; *$p < .05$

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Table 6: Comparison of prenatal coping inventory at T1 and T2

Prenatal Coping Inventory	Intervention (n = 64)	Control (n = 56)	*p*
T1			
Prenatal coping inventory			
Preparation for motherhood	16.00 (4.62)	15.13 (4.52)	.305
Avoidance	7.10 (3.60)	6.62 (3.60)	.474
Positive appraisal	11.03 (3.76)	10.22 (4.45)	.287
Prayer	6.27 (1.74)	6.16 (1.55)	.729
Seeking social support*	5.90 (1.40)	5.29 (1.10)	.010*
Distraction	1.73 (1.49)	1.56 (1.49)	.546
Self-care**	5.27 (1.36)	4.36 (1.75)	.002**
Substance use	1.21 (1.30)	0.96 (1.14)	.285
T2			
Prenatal coping inventory			
Preparation for motherhood	15.45 (4.59)	14.56 (4.87)	.308
Avoidance	6.69 (3.18)	6.71 (3.68)	.974
Positive appraisal	10.95 (3.97)	10.02 (4.51)	.229
Prayer	6.16 (1.65)	5.80 (1.65)	.243
Seeking social support**	5.41 (1.50)	4.66 (1.28)	.004**
Distraction	1.59 (1.42)	1.43 (1.50)	.537
Self-care**	4.66 (1.37)	3.71 (1.73)	.001**
Substance use	1.10 (1.01)	0.82 (1.05)	.150
Prenatal Coping Inventory	**FP (n = 36)**	**Control (n = 56)**	***p***
T1			
Prenatal coping inventory at T1			
Preparation for motherhood	[2] 15.44 (4.37)	[1] 15.13 (4.52)	.748
Avoidance	[1] 7.29 (3.26)	[1] 6.62 (3.60)	.377
Positive appraisal	[2] 11.35 (4.16)	[1] 10.22 (4.45)	.234
Prayer	[1] 6.29 (1.93)	[1] 6.16 (1.55)	.742
Seeking social support*	[1] 5.91 (1.50)	[1] 5.29 (1.10)	.038*
Distraction	[1] 1.80 (1.43)	[1] 1.56 (1.49)	.458
Self-care*	[1] 5.20 (1.37)	[1] 4.36 (1.75)	.018*
Substance use	[1] 0.97 (1.04)	[1] 0.96 (1.14)	.974
T2			
Prenatal coping inventory at T2			
Preparation for motherhood	15.22 (3.80)	[1] 14.56 (4.87)	.495
Avoidance	[1] 7.14 (3.40)	6.71 (3.68)	.579
Positive appraisal*	11.94 (3.95)	10.02 (4.51)	.039*
Prayer	[1] 6.23 (1.50)	5.80 (1.65)	.218
Seeking social support**	5.64 (1.42)	4.66 (1.28)	.001**
Distraction	1.72 (1.54)	1.43 (1.50)	.367
Self-care**	4.94 (1.31)	3.71 (1.73)	.000**
Substance use	1.00 (0.96)	0.82 (1.05)	.411
Prenatal Coping Inventory	**FP (n = 36)**	**Not FP (n = 22)**	***p***
T1			
Prenatal coping inventory			
Preparation for motherhood	[2] 15.44 (4.37)	16.5 (5.32)	.420
Avoidance	[1] 7.29 (3.26)	6.86 (3.82)	.658
Positive appraisal	[2] 11.35 (4.16)	[1] 10.38 (3.41)	.372
Prayer	[1] 6.29 (1.93)	6.41 (1.53)	.801
Seeking social support	[1] 5.91 (1.50)	5.82 (1.33)	.807
Distraction	[1] 1.80 (1.43)	1.59 (1.37)	.587
Self-care	[1] 5.20 (1.37)	5.27 (1.24)	.840
Substance use	[1] 0.97 (1.04)	1.50 (1.54)	.127
T2			
Prenatal coping inventory T2			
Preparation for motherhood	15.22 (3.80)	16.64 (5.70)	.309
Avoidance	[1] 7.14 (3.40)	6.36 (2.99)	.381
Positive appraisal*	11.94 (3.95)	9.77 (3.41)	.037*
Prayer	[1] 6.23 (1.50)	6.36 (1.43)	.737
Seeking social support	5.64 (1.42)	5.36 (1.26)	.457
Distraction	1.72 (1.54)	1.41 (1.37)	.437
Self-care	4.94 (1.31)	4.59 (1.14)	.300
Substance use	1.00 (0.96)	1.23 (1.19)	.428

[ ] = no of missing data; $^{**}p < .01$, $^{*}p < .05$

Table 7: Comparison of EPDS at T1, T2 and T3

Edinburgh postnatal depression scale (EPDS)	Intervention (n = 64)	Control (n =56)	*p*
	Mean (SD)	Mean (SD)	
T1	[1] 7.95 (3.58)	6.96 (3.94)	.154
T2	6.77 (3.79)	[4] 6.50 (3.32)	.692
T3	[17] 6.62 (3.93)	[7] 6.31 (4.56)	.722
	Frequent practice (n = 36)	**Control (n =56)**	
T1	[1] 7.46 (3.50)	6.96 (3.94)	.546
T2	6.64 (3.84)	[4] 6.50 (3.32)	.857
T3	[9] 6.04 (3.51)	[7] 6.31 (4.56)	.791
	Frequent practice (FP) (n = 36)	**Not FP (n =22)**	***p***
T1	[1] 7.46 (3.50)	8.23 (3.62)	.428
T2	6.64(3.84)	6.95(4.02)	.766
T3	[9] 6.04 (3.51)	[7] 7.53 (5.06)	.320

[ ] = no of missing data

Quantitative results from the increase in mindfulness and positive affect and the decrease in pregnancy anxiety, depression and negative affect. Byrne *et al.*[97] developed a mindfulness- and skills-based antenatal education program (MBCE) for pregnant women and their birth support partners which aimed at increasing the health literacy and resilience of women and their birth partners as a possible way of preventing post-natal depression, maternal dissatisfaction with labour and maternal/paternal stress, which is linked to a range of negative child development outcomes.

Robledo-Colonia *et al.*[190] found that aerobic exercise training during pregnancy reduces depressive symptoms in nulliparous women. Satyapriya *et al.*[191] studied the effect of integrated yoga on pregnancy experience, anxiety, and depression in normal pregnancy and found out that the intervention reduces anxiety, depression and pregnancy related uncomfortable experiences. Youngwanichsetha *et al.*[113] found that mindfulness eating and yoga exercise had health benefits on glycemic control in pregnant women with gestational diabetes mellitus.

Pregnant women face a considerable amount of stress during perinatal period because of the emotional, physical, and interpersonal changes. Stress and coping is the point where interventions take place. The cycle of stress and the ineffective use of coping resources of pregnant women can adversely affect the development life course of the pregnant woman, birth outcomes, and her infant.[103, 192] Interventions during the perinatal period are the best way to strengthen the coping strategies and stress management for pregnant women with better outcomes.[103, 159, 191, 193] Present study showed that EBMI may have effect on coping mechanism through improvement in positive appraisal as shown in Prenatal Coping Inventory in FP group at T2 when compared with control and Not FP group ($p < .05$) (see Table 6). Present intervention may be effective in promoting maternal health through improved stress-coping mechanism.[15, 194, 195] The positive effect of EBMI in the present study may provide a foundation for future development of effective intervention in perinatal emotional problems.

Most of the randomized controlled trials examined the effectiveness of antenatal group interventions at preventing postnatal depression in "at risk" women.[100, 189, 196–199] Duncan & Bardacke[189] reported that participants in the Mindfulness-Based Childbirth and Parenting (MBCP) program will have decrease in pregnancy anxiety, depression and negative affect. Carolan *et al.*[200] found that singing is an activity with stress reducing and other benefits for pregnant women with stress. Present study indicated no difference in depressive symptoms in EPDS (see Table 7) between intervention and control group at T2 and T3. It is probably because EBMI is intended to promote maternal health and fetal health, but not to treat depression. To emphasize the psychoeducational nature of the intervention, participants were invited to attend the EBMI "course", not to enter "therapy". Present research is not intended to identify a group at high imminent risk of peri-partum depression and determine whether the intervention reduces incidence in comparison with to a control group. Another reason for no significant group effect on depressive symptoms is that depressive symptoms of the participants in the intervention and control group tested using EPDS (see Table 7) showed no significant differences between the groups and there was no suspected case identified that required further referral. Small sample size and too many missing data at T3 may also contribute to the no reduction in depressive symptoms.

Cortisol level in hair, plasma, urine and saliva are index for psychological status in pregnant women despite the systemic alterations associated with the endocrinology of pregnancy.[37, 161, 201–206] Shea *et al.*[123] using salivary cortisol to investigate the cortisol awakening response in pregnant women in relation to stress found significant associations between baseline awakening cortisol levels at 20 weeks of gestation and early life trauma, but not with depression or anxiety. Pluess *et al.*[122] reported that maternal trait anxiety proved related to all stress-related psychological measures and high anxiety predicted low baseline cortisol awakening levels in early pregnancy. Ventura *et al.*[207] revealed that a relaxing intervention as short as 30 min like listening to music, decreases plasma cortisol and self-reported state anxiety score for pregnant women awaiting amniocentesis. Pluess *et al.*[208] found that positive life events in pregnant women predicted lower third-trimester baseline awakening cortisol levels. O'Donnell *et al.*[34]testified that there are small but persisting associations between maternal prenatal mood and diurnal cortisol in the child that persist into adolescence and may constitute a programming effect.

Table 8: Comparison of BMSWBI at T1, T2, T3 and T4 (FP and Control)

BMSWBI	FP (n = 36)	Control (n = 56)	*p*
T1			
Physical distress	[1] 28.66 (17.30)	[2] 28.57 (19.68)	.984
Daily functioning	[1] 62.49 (13.43)	[2] 61.44 (14.94)	.734
Affect			
Negative affect	[1] 28.69 (18.25)	25.45 (18.94)	.423
Positive affect	[2] 55.85 (12.75)	[2] 51.69 (12.28)	.130
Total score	[2] 137.12 (24.59)	[2] 135.74 (26.96)	.810
Spirituality			
Tranquility	[1] 26.11 (7.58)	25.82 (7.42)	.856
Disorientation	[1] 4.71 (5.72)	3.64 (5.91)	.396
Resilience*	[1] 22.03 (5.84)	[1] 19.22 (6.52)	.041*
Total score	[1] 93.43 (15.27)	[1] 91.24 (15.74)	.516
Total score for BMSWBI	[3] 400.73 (55.35)	[6] 399.18 (63.55)	.909
T2			
Physical distress	[1] 29.14 (17.04)	26.93 (21.31)	.605
Daily functioning	61.06 (16.01)	[1] 58.69 (16.58)	.502
Affect			
Negative affect	25.44 (17.00)	24.64 (18.95)	.837
Positive affect	54.92 (14.20)	[1] 49.95 (12.80)	.086
Total score	139.47 (25.47)	[1] 135.58 (24.38)	.467
Spirituality			
Tranquility	27.14 (7.52)	25.86 (7.44)	.424
Disorientation	3.03 (5.52)	2.88 (5.39)	.896
Resilience*	21.25 (5.19)	18.54 (6.81)	.044*
Total score	95.36 (14.96)	91.52 (15.47)	.242
Total score for BMSWBI	[1] 408.54 (58.56)	[2] 400.43 (64.29)	.549
T3			
Physical distress*	[9] 27.04 (18.23)	[8] 18.29 (14.96)	.028*
Daily functioning	[8] 54.75 (14.35)	[9] 58.62 (17.14)	.320
Affect			
Negative affect	[8] 30.04 (18.96)	[7] 24.65 (21.38)	.272
Positive affect	[8] 53.79 (13.94)	[8] 50.40 (15.57)	.345
Total score	[8] 133.75 (30.55)	[8] 135.44 (32.90)	.825
Spirituality			
Tranquility	[8] 26.75 (8.18)	[7] 25.71 (7.76)	.582
Disorientation	[8] 3.50 (5.33)	[8] 4.08 (6.79)	.698
Resilience	[8] 20.07 (6.30)	[7] 20.76 (5.62)	.624
Total score	[8] 93.32 (15.87)	[7] 92.29 (17.17)	.795
Total score for BMSWBI	[9] 397.48 (60.05)	[12] 408.45 (70.82)	.505
T4			
Physical distress	[12] 28.42 (24.43)	[9] 21.81 (16.48)	.181
Daily functioning	[13] 60.96 (16.86)	[9] 60.68 (15.67)	.946
Affect			
Negative affect	[12] 29.96 (24.01)	[9] 24.04 (18.87)	.259
Positive affect	[12] 56.33 (13.14)	[10] 50.17 (15.42)	.100
Total score	[12] 136.38 (33.13)	[10] 135.76 (28.75)	.936
Spirituality			
Tranquility	[12] 26.79 (8.54)	[9] 26.72 (7.22)	.972
Disorientation	[12] 5.79 (9.74)	[9] 5.72 (10.61)	.979
Resilience	[12] 21.58 (6.43)	[9] 20.04 (6.04)	.323
Total score	[12] 92.58 (19.62)	[9] 91.04 (18.47)	.746
Total score for BMSWBI	[13] 406.61 (73.08)	[10] 404.98 (66.44)	.926

[ ] = no of missing data; *$p < .05$

Table 9: Comparison of maternal salivary cortisol level at T1, T2, T3 and T4

Maternal Salivary Cortisol	Intervention (n = 64)	Control (n =56)	*p*
	Mean (SD)	Mean (SD)	
T1			
Morning	10.58 (5.09)	11.86 (5.12)	.183
Evening*	1.35 (1.16)	1.86 (1.39)	.033*
Mean	5.97 (2.71)	6.87 (2.66)	.079
T2			
Morning	9.91 (5.40)	9.97 (4.42)	.947
Evening	3.65 (2.25)	3.68 (2.36)	.957
Mean	6.77 (3.24)	6.75 (2.59)	.969
T3			
Morning	6.25 (4.18)	7.42 (6.43)	.337
Evening	0.70 (0.87)	1.40 (2.24)	.080
Mean	3.46 (2.15)	4.31 (3.60)	.221
T4			
Morning	6.62 (5.45)	6.00 (5.16)	.595
Evening	1.08 (1.60)	1.81 (3.65)	.249
Mean	3.91 (3.11)	3.94 (3.92)	.964
Maternal Salivary Cortisol	**FP (n = 36)**	**Control (n = 56)**	***p***
	Mean (SD)	**Mean (SD)**	
T1			
Morning	[2] 10.32 (4.63)	[3] 11.86 (5.12)	.158
Evening	[3] 1.46 (1.33)	[1] 1.86 (1.39)	.190
Mean	[3] 5.90 (2.32)	[3] 6.87 (2.66)	.097
T2			
Morning	[3] 9.56 (5.60)	[1] 9.97 (4.42)	.708
Evening	[3] 3.97 (2.68)	[6] 3.68 (2.36)	.600
Mean	[3] 6.76 (3.46)	[7] 6.75 (2.59)	.984
T3			
Morning	[11] 6.16 (4.22)	[18] 7.42 (6.43)	.389
Evening*	[11] 0.60 (0.67)	[18] 1.40 (2.24)	.046*
Mean	[11] 3.38 (2.16)	[19] 4.31 (3.60)	.254
T4			
Morning	[11] 5.77 (5.49)	[15] 6.00 (5.16)	.869
Evening	[11] 0.92 (1.40)	[15] 1.81 (3.65)	.270
Mean	[13] 3.43 (3.14)	[17] 3.94 (3.92)	.597

[ ] = no of missing data; *$p < .05$

These findings suggest that positive experiences are of relevance and reflecting a resource with potentially beneficial effects for the mother and the development fetus. It might be promising for psychological intervention programs to focus on increasing positive experiences of the expecting mother rather than exclusively trying to reduce maternal stress during pregnancy.Present study did not show any difference in maternal salivary cortisol level between intervention and control group at T1, T2, T3 and T4. This is not unexpected as present research showed no difference in depressive symptoms in EPDS (see Table 7) between intervention and control group at T1 and T2. Both groups are mentally healthy at start and there was no suspected case identified that required further referral.

Present research indicated that the control group had a steeper decline in diurnal salivary cortisol level as compared with FP group at T3 ($p < .05$) (see Table 8). The significance of this finding may indicate perinatal meditation have beneficial effects on postnatal mental health. Small sample size and too many missing data at T3 and T4 may affect the

results of present research.

Postnatal care is important but women have consistently rated postnatal care less favorably than other episodes of maternity care.[78, 209, 210] Present study find out that perinatal meditation can help pregnant women to reduce stress in postnatal period as shown by the control group had a steeper decline in diurnal salivary cortisol level as compared with FP group at T3 (see Table 8). The score on physical distress (BMSWI) between FP and control group at T3 is of statistical significant ($p < .05$) (see Table 8) implied that EBMI may decrease postnatal physical distress which are risk factors for maternal health, fetal health and future child health. The design of EBMI is based on the chance of practice on daily basis and incorporates into the daily activities of the participants.[112, 113] There were more than 60% of participants who practice EBMI frequently (FP group) as compared with other interventions.[25, 188, 199, 204, 211, 212] Frequency of practice is the key point for the success of any intervention provided. As shown by present research, only the FP group have improvement when compared with control but not the intervention group or Not FP group.

One of the limitations in present research is using convenience sample. Another limitation of present research is that with a relatively long recruitment period, the findings must be interpreted cautiously. Too much missing data at T3 and T4 also lead to the difficulties in interpreting the results. Meditation research in addition has suffered from significant methodological and conceptual limitations. Present study found that there are insufficient existing instruments to measure positive health markers in normal population in order to assess the effectiveness of interventions in holistic dimensions.

5 Implications

Perinatal meditation can be added into present prenatal counselling and prenatal and postnatal program to promote pregnancy health, child health and family health.[75, 85, 213–215] This model of intervention serves as a good example of preventive medicine (Sado *et al.*, 2014). Healthcare providers should provide meditation as complementary therapy for women's other life events like preconception, infertility, pregnancy loss and peri-menopausal life time.[216–220]

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Conflicts of Interest Disclosure

The authors declare no conflict of interest.

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