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Research Article

Effectiveness of progressive muscle relaxation therapy on pregnancy outcomes among stressed and anxious primigravida antenatal mothers: A randomized controlled trial

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Key words: Progressive Muscle Relaxation, Primigravida mothers, pregnancy outcomes

Background

Progressive muscle relaxation therapy is an anxiety and stress reducing method. Anxiety and stress during antenatal period cause many adverse effects on pregnancy outcomes; therefore require early screening and management of those conditions to improve pregnancy outcomes.

Objective

Our objective was to evaluate effectiveness of progressive muscle relaxation therapy in improving pregnancy outcomes among primigravida mothers in Badulla district.

Methods

A community-based cluster randomized controlled trial was conducted among 288 primigravida mothers in latter stage of second trimester who screened to have anxiety or stress or both by Depression Anxiety Stress Scale-21 (DASS-21). 144 primigravida mothers were recruited to each intervention and control arms from six selected Medical Officer of Health areas in Badulla district. Pregnancy outcomes were compared in both arms at one month post-partum by calculating Pearson's correlation coefficient.

Results

Pregnancy outcomes at one month post-partum showed significant differences in the control arm compared to the intervention arm; in caesarean section or assisted vaginal delivery (OR = 2.44; 95% CI = 1.34, 4.46), delivery of baby before 37 weeks of gestation (OR = 2.35; 95% CI = 1.31, 4.21), prolong labour (OR = 4.93; 95% CI = 1.05, 23.27) and experienced post-natal complications in babies (OR = 2.12; 95% CI = 1.03, 4.35).

Conclusions

Progressive muscle relaxation therapy was effective in improving pregnancy outcomes in primigravida mothers.

Introduction

Motherhood in primigravida is the premium decisive point in life of mother, offspring, and whole society. Particularly for primi mothers, pregnancy is a stressful condition affecting their quality of life. Changes in the body, increasing demands, shifting of roles, and different interpersonal relationships have been signs of perinatal psychological stress [(1)].

Mental health problems in pregnancy is a major public health problem globally. Pregnancy gives rise to physiological and emotional situations: depression, anxiety, stress, and psychoses which can adversely influence the health of the mother and the newborn [(2)].

Antenatal mental disorders can be expressed as stress[(3)], anxiety and/or depressive symptoms [(3,4,5,6)] and can be screened using self-reporting scales or by assessment of experienced clinicians. These are common among pregnant women with other pregnancy problems and has been found to be 12 – 15% on self-report scales [(5)].

Anxiety is a symptom present in many disorders. According to DSM V, "anxiety disorders include disorders that share features of excessive fear and anxiety and related behavioural disturbances"[(7)]. Anxiety during pregnancy is a particular type of maternal psychological distress that is defined in relation to a mother's health, the baby's health, labour, and delivery process of pregnancy[(8)].

Evidence shows that anxiety not only affects pregnant women's health but also have an impact on caesarean birth, low birth weight, preterm delivery and prolonged labour[(9,10,11,12)]. Previous research on anxiety concluded that pregnancy-specific anxieties are the accurate predictors of adverse labour outcomes than general anxiety. Neonates of prenatally anxious mothers had a higher risk of premature birth and low birth weight [(13)].

Stress is a situation that disturbs, or is likely to disturb, a person's normal physiological or psychological functioning. Stress in the pregnancy period is defined as "the imbalance that a pregnant woman feels when she cannot cope with demands, which is expressed both behaviourally and psychologically" [(14)].

Most studies have proved that high antenatal stress and mood disorders will cause problems for both mother and fetus, including premature birth [(11,15)], higher risk of developing hypertension and preeclampsia [(16)], problems in lactation and increased tendency to mood disorders and autoimmune phenomena during the postpartum period [(17)]. Moreover, maternal stress will adversely affect the fetus with the infant's low birth weight [(18,19)].

Progressive muscle relaxation therapy is an effective and widely used mind-body interventional strategy to relieve stress and anxiety. It is a therapy with tensing and relaxation of four major muscle groups in our body [(1) face (2) neck and shoulders (3) both hands and arms (4) both legs and feet] in order from the head to feet. It was first developed in 1929 by the Chicago physician Edmund Jacobson and later manualised in an abbreviated format by Bernstein and Borkovec[(20)].

When the skeletal muscle fibers contract, it leads to muscle tension; the result of a complex interaction of the central and peripheral nervous system with the muscular & skeletal systems, and relaxation occurs during the absence of perceived muscle tension. The sympathetic and parasympathetic nervous systems often work reciprocally in that elevated activation of one, leading to the deactivation of the other. Sympathetic activation is called the ergotropic or 'fight or flight' response, and parasympathetic activation is called the relaxation response or trophotropic, which

promotes rest and repair. Parasympathetic responses include reductions in heart rate and blood pressure, stress and anxiety [21].

Beddoe and Lee [22] identified that PMR was the most common intervention used in most studies when they conducted a systematic review to reveal the efficacy of mind-body intervention in antenatal period on perceived stress, mood, and pregnancy outcome. Literature search was carried out through PubMed, Cinahl, PsycINFO, and the Cochrane Library between 1980 and February 2007. Twelve out of 64 published intervention studies, Progressive muscle relaxation was the most common intervention used in those studies. Other studies used a multimodal psycho-education approach or a yoga and meditation intervention. Intervention group outcomes revealed higher birth weight, shorter length of labour, fewer instrument-assisted births, and reduced perceived stress and anxiety.

Antenatal mental disorders are associated with adverse birth outcomes [23] and adverse pregnancy outcomes (both maternal and neonatal/ infant) and maternal deaths, which are global public health problems [24,25]. Antenatal mental disorders will lead to many problems during antenatal, postpartum periods and in newborn baby. The health care system in Sri Lanka should focus on addressing maternal psychological aspects and reduce the burden of such morbidities, in order to strengthen the mother as well as the new generation.

Although researchers have focused more on assessing the correlations between antenatal depression, anxiety, stress, and pregnancy outcome, not enough studies highlight the value of Progressive Muscle Relaxation in reducing stress and anxiety during pregnancy and improving pregnancy outcomes [22]. Therefore in Sri Lanka, there is a timely need in addressing an intervention to reduce maternal stress and anxiety among primigravida antenatal mothers and there by improve the pregnancy outcomes.

In this purview, this research was conducted to evaluate the effectiveness of a progressive muscle relaxation therapy during the antenatal period in improving selected pregnancy outcomes.

Methods

This study was a community-based cluster randomized controlled trial, with a prospective pretest-posttest experimental design. It was carried out in field antenatal clinics and at household level among 288 primi mothers, who were above 18 years of age, with an uncomplicated singleton pregnancy, in their latter stage of second trimester (20 to 28 weeks of gestation), in selected PHM areas as intervention and control arms in Badulla District (a cluster was a PHM area) from May to November 2020.

The gestational age second trimester was selected for several reasons. Firstly, during this period, they were usually well established in their prenatal care. Secondly, time was available to perform progressive muscle relaxation for 6 weeks and also for assessing outcomes. Thirdly, anxiety and fear are much less in this period in primi mothers compared to first and third trimesters[23]. Primi mothers who were diagnosed with any psychiatric illness and any physical or learning disability, practicing any other relaxation technique associated with any other medical or obstetric complications were excluded from the study.

Recruited participants had anxiety or stress or both (Anxiety Score > 16, Stress Score > 20) screened by Depression Anxiety Stress Scale-21 (DASS-21). The DASS-21 tool, was translated from English to Sinhala language, culturally adapted and judgmental validity had been established using Modified Delphi process with a panel of

experts in Psychiatry and Psychology[24], with a sensitivity of 97.1%, specificity of 97.6%.

Six MOH areas were selected; three of them which for the intervention arm, which were adjacent and other three which were for the control arm was not adjacent to them. Within each MOH area six PHM areas were selected randomly using a random number table. This study being involving in antenatal clinic setup, a high risk of contamination between primigravida mothers sharing the same antenatal clinic at the PHM area level was anticipated at the design stage. Therefore, the randomization done at the cluster (PHM) level. Randomization to the two groups was performed by the PI. The data collectors and data entry personals remained blinded about the intervention allocation. During each step of the randomization process, screening of primi mothers, data collection in pre and post intervention periods the PI ensured that the data collectors were blinded.

A two-day training program on "progressive muscle relaxation therapy" was conducted by an occupational therapist for selected 18 PHMM, to prepare them as the field facilitators to deliver the intervention to the primi antenatal mothers in the intervention group. They were given a simulation exercise on the second day to practice progressive muscle relaxation therapy with a video CD and a guide booklet prepared by the PI on how to conduct progressive muscle relaxation therapy for the primi antenatal mothers. The control group FFs were given the instructions on how to follow-up mothers who recruited for the study.

Selected primigravida mothers were provided with an information sheet and consent form and a registration form to collect socio-demographic details of the participant with personal details, including the name of the participant and husband, contact numbers along with addresses, were taken in order to follow them up in one month post-partum. The losses to follow-up were minimised by obtaining contact details of the participants and details of immediate family members. A data extraction form to evaluate the selected pregnancy outcome at one month post-partum was administered to the mothers in the intervention and control groups.

At the particular antenatal clinic in the selected PHM area in the intervention arm, the PI or data collectors selected eight couples, who consented to carry out progressive muscle relaxation. The PI or FF demonstrated progressive muscle relaxation to the couples, explaining each step carefully and study participants were followed it. It was an interactive teaching-learning session. The PI explained the progressive muscle relaxation therapy with the help of the video and participants were seated in a comfortable position to watch the video. The video consisted of how to perform progressive muscle relaxation therapy step by step. The video session was 20-25 minutes in duration and was in Sinhala. Study participants were enrolled for the intervention for over a six-week duration, practicing PMR therapy at home.

Ethical approval for the study was obtained from the Ethics Review Committee of the Post Graduate Institute of Medicine (PGIM), University of Colombo and Ethics Review Committee of Sri Lanka Medical Association. The study was a clinical trial, so it was registered in the Sri Lanka Clinical Trial Registry of Sri Lanka Medical Association under the registration number SLCTR/2020/013.

Results

The response rate for this study component was 96.5% for the intervention groups and 93.1% for the control group.

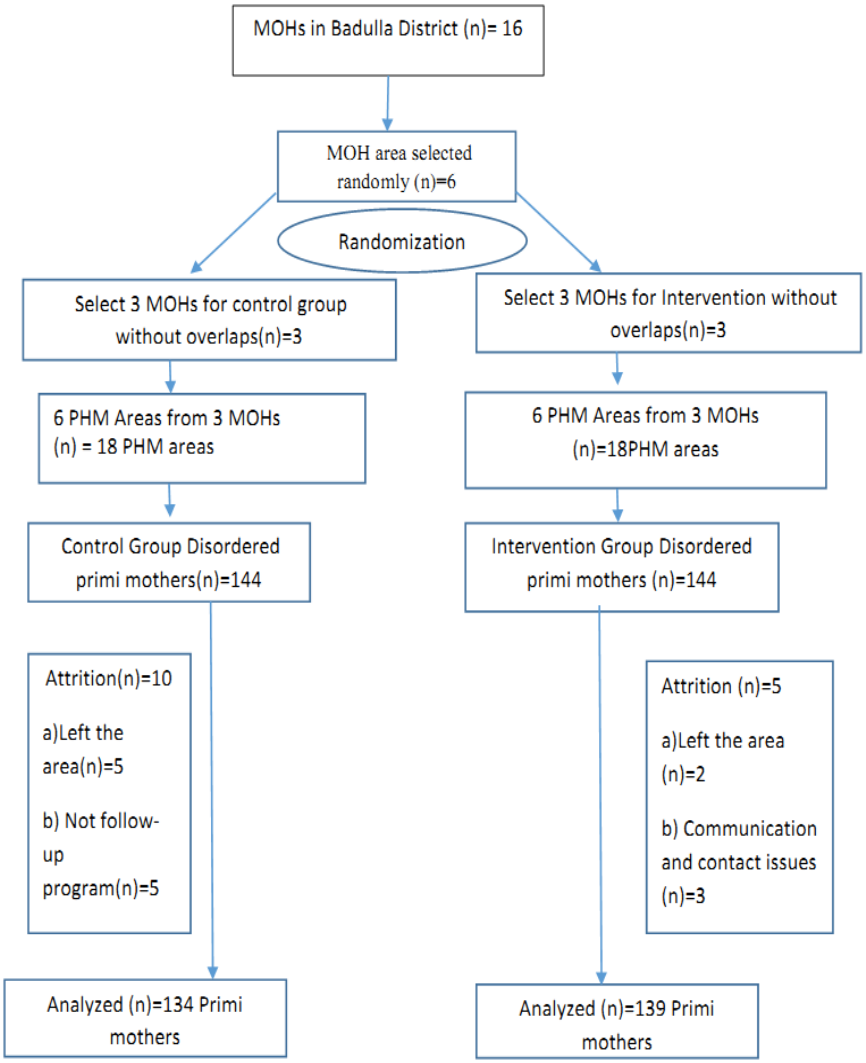

Figure 2: Floor chart of recruitment of study participants

The mean age of primi mothers in the intervention group was 24.22 years (SD=4.16), while the mean age of primi mothers in the control group was 24.88 years (SD=5.08). The mean age in the two groups was not statistically significant (p = 0.24). Study participants were relatively evenly distributed by age within the two groups; while the highest percentage (48.4%, n=132) was from 20 – 25 years age category, compared to the lowest percentage (2.2%, n=8) from more than 35 years category, who were the elderly primi mothers.

In terms of the demographic characteristics of the study population, half of them were Sinhala (52.7%, n = 144), Buddhists (50.9%, n = 139). Almost all primi mothers (96.7%, n = 264) were married, and nearly three quarter of primi mothers were married for less than three years (86.4%, n = 236). Nearly half of the primi mothers (41.8%, n=114) were educated up to G.C.E.O/L, three quarters (81.7%, n = 223) of them were unemployed, and 30% (n = 82) of them had a monthly income more than Rs 40000. A higher proportion (60.4%, n=165) of spouses of primi mothers were in the 26 – 35 years age category, nearly half (46.1%, n=126) of them were educated up to G.C.E.O/L, and most of them (76.2%, n=208) were labourers.

Pregnancy outcomes were assessed in terms of mode of delivery, gestational age at birth, Apgar score, prolong labour, post-partum complications of the mother and post-partum complications of baby.

Table 1: Frequency distribution of pregnancy outcomes between the two group

Characteristics	Intervention group (n = 139)		Control group (n = 134)		Total (n = 273)	
	No	%	No	%	No	%
Mode of delivery						
NVD	119	85.6	95	70.9	214	78.4
Assisted delivery	7	5.0	12	9.0	19	7.0
LSCS	13	9.4	27	20.1	40	14.6
Gestational age at birth						
28 – 32 weeks	0	0.0	1	0.7	1	0.4
33 – 36 weeks	22	15.8	40	29.9	62	22.7
37 – 40 weeks	116	83.5	92	68.7	208	76.2
> 40 weeks	1	0.7	1	0.7	2	0.7
Apgar score						
4 - 6	6	4.3	10	7.5	16	5.9
7 - 10	133	95.7	124	92.5	257	94.1
Prolong labour						
Yes	2	1.4	9	6.7	11	4.0
No	137	98.6	125	93.3	262	96.0
Post-partum complications of mother						
Yes	17	12.2	23	17.2	40	14.7
No	122	87.8	111	82.8	233	85.3
Post-natal complications of baby						
Yes	13	9.4	24	17.9	37	13.6
No	126	90.6	110	82.1	236	86.4

A higher proportion (85.6%), of mothers underwent normal vaginal delivery, and only 9.4% of them had caesarean sections in the intervention group, while 70.9% of mothers underwent a normal vaginal delivery and 20.1% had caesarean sections in the control group. The majority, (83.5%) of the babies in the intervention group and 68.7% babies in the control group, were delivered between 37–40 weeks of the mother's gestation. Nearly all babies, (95.7%) in the intervention group and

92.5% in the control group, had an Apgar score of 7 – 10 at five minutes from birth. Almost all (98.6%) mothers in the intervention group and 93.3% mothers in the control group, had not experienced prolonged labour. Only 12.2% mothers in the intervention group and 17.2% mothers in the control group experienced post-partum complications. They were reported as post-partum haemorrhage, post-partum pyrexia, hypertension, diabetes mellitus and anaemia. Only 9.4% babies of the intervention group mothers and 17.9% babies of the control group mothers experienced post-natal complications. They were reported as jaundice, pyrexia, hypoglycaemia, birth asphyxia and birth injuries (Table 1). Pregnancy outcomes were compared between the two groups using chi-square test. Results are shown in the table 2 below.

Table 2: Comparison of pregnancy outcomes in the two groups

Pregnancy outcomes	Control group (n=134)	Intervention group (n=139)	Total (n=273)	COR	95% CI	Significance
	No. (%)	No. (%)	No. (%)			
Mode of delivery						
Other	39 (66.1)	20 (33.9)	59 (100)	2.44	(1.34, 4.46)	χ^2=8.72 df=1, **p=0.003**
NVD*	95 (44.4)	119 (55.6)	214 (100)	1.00		
Gestational age at birth						
< 37 weeks	41 (65.1)	22 (34.9)	63 (100)	2.35	(1.31, 4.21)	χ^2=8.38 df=1, **p=0.004**
> 37weeks*	93 (44.3)	117 (55.7)	210 (100)	1.00		
Apgar score						
< 6	10 (62.5)	6 (37.5)	16 (100)	1.79	(0.63, 5.06)	χ^2=1.22 df=1, p=0.27
> 7*	124 (48.2)	133 (51.8)	257 (100)	1.00		
Prolong labour						
Yes	9 (81.8)	2 (18.2)	11 (100)	4.93	(1.05, 23.27)	χ^2=4.91 df=1, **p=0.027**
No*	125 (47.7)	137 (52.3)	262 (100)	1.00		
Post-partum complications of mother						
Yes	23 (57.5)	17 (42.5)	40 (100)	1.49	(0.76, 2.93)	χ^2=1.33 df=1, p=0.25
No*	111 (47.6)	122 (52.4)	233 (100)	1.00		
Post-natal complications of baby						
Yes	24 (64.9)	13 (35.1)	37 (100)	2.12	(1.03, 4.35)	χ^2=4.27 df=1, **p=0.04**
No*	110 (46.6)	126 (53.4)	236 (100)	1.00		

When assessing the pregnancy outcomes at the post-partum one month period of mothers in the two groups, caesarean section or assisted vaginal delivery (OR = 2.44; 95% CI = 1.34, 4.46; p=0.003), deliver the baby before 37 weeks of gestation (OR = 2.35; 95% CI = 1.31, 4.21; p = 0.004), prolong labour (OR = 4.93; 95% CI = 1.05, 23.27) (p=0.027) and experienced post-natal complications in babies (OR = 2.12; 95% CI = 1.03, 4.35) (p = 0.04) were significantly associated factors in the control group post-partum primi mothers with compared to the intervention group post-partum mothers (Table 2).

Discussion

In the present study, PMR therapy was applied to the primigravida mothers with anxiety and/ or stress. The study methods were consistent with the other studies done by Tragea et al., [25] and Bastani et al., [26] where in a similar way primigravida mothers with anxiety and stress were selected for the study and applied the PMR therapy for the intervention group.

In the present study the anxiety and stress were measured by the DASS-21 similarly, in a study by Nasiri et al.,[27], in Iran also used the EPDS and DASS-21 scales to measure the anxiety, stress and depression levels of the mothers before practicing PMR therapy.

In the present study, PMR therapy was applied for six weeks duration, similarly, Rajeswary & Sanjeeva Reddy [28], Nasiri et al.,[27] and Tragea et al.,[25] study participants practiced the PMR therapy for six weeks duration. However, Bastani et al.,[26] reported that they applied the PMR therapy for seven weeks duration on primigravida mothers.

High response rate of participants in both groups were achieved in the present study; via telephone reminders once a week, at every possible time PI or FF was able to visit the study participants houses, maintenance of a diary on performance of PMR therapy and by direct reinforcement during their field antenatal clinic visits.

Some studies [28,26] have found that there was a statistical difference in the mode of delivery, gestational age at birth between the two groups ($p<0.001$) similar to this study. Post-natal complications in the babies showed a statistically significant difference between the intervention and controls groups ($p = 0.04$), but in another study[28], revealed that there was an increased risk of having neonatal complications in the control group in comparison with study group.

One limitation in the study was, the researcher had no control over the pregnancy outcome such as gestation age at birth, mode of delivery and other complications, because it might be influenced by other factors such as nutritional, familial and genetic factors.

Screening for anxiety and stress in antenatal mothers and intervene them to reduce the burden via PMR like simple, economicaly effective and easy practicing therapy will be useful in the future to improve maternal mental health component and there by improve the pregnancy outcomes.

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