



Effect of yoga on low back pain, physical and psychological (Anxiety, depression and quality of life) function in postpartum women

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Abstract

Background: Postpartum period begins immediately after the birth of child as the mother's body, including the hormone level and the uterus size, returns to non-pregnant state. It is characterized by three distinct phases; initial/acute period, subacute postpartum period and delayed postpartum period. It is a critical stage in which a series of changes occur in a woman. This study aimed to assess the effectiveness of yoga on low back pain intensity, physical and psychological function in postpartum women. However, there is limited evidence examining the effectiveness of yoga in relieving pain and improving physical as well as psychological function in women with postpartum low back pain.

Method: Forty primigravida postpartum women in the age group of 21-26 years were recruited via purposive sampling technique. The participants were randomly allocated in two groups: intervention group (n=20) (pawanuktasana, dandasana, chaturanga dandasana), pranayama (anulom vilom), meditation & control group (n=20) standardised ergonomic advises, postural education, patient education and personalised psychological education was given to the participants in the control group. The outcome measures for pain intensity, physical and psychological function was reassessed on 4th, 8th & 12th week

Result: The result of the present study revealed that when both the groups were compared on the basis of their effect size it was observed that intervention group had significant and better results than the control group.

Conclusion: Pain intensity, physical and psychological (anxiety, depression and quality of life) function improved with yoga intervention as compared to control group.

Keywords: Anxiety, depression, quality of life, postpartum women

Introduction

Postpartum (or postnatal) period termed as "fourth stage of labor" begins immediately after birth of a child and lasts up to mother's hormonal levels and uterine size return to pre-pregnant state. Characterized by three distinct phases; [initial/acute period (first 6–12 hours postpartum), subacute postpartum period (2–6 weeks) and delayed postpartum period (up to 6 months)], it is a critical stage in which a series of changes occur in a woman [1]. study says that impact of postpartum period on physical, psychic and social function. Apart from hemorrhoids, constipation, urinary discomfort, incontinence and infection, musculoskeletal pain (back, perineal, chest and head), tiredness, sadness, anxiety and depression are common impediments faced by women during puerperium [2].

Among general population, low back pain has been reported as most common musculoskeletal pain affecting adult population. Prevalence of low back pain in postpartum women is estimated to be 28% to 50% after 3 to 5 months [4]. literature describes low back pain during and after pregnancy using terminology such as pregnancy-related low back pain, pelvic girdle pain, pregnancy-related pelvic girdle pain, lumbo pelvic pain, and lumbar pain. Pregnancy related low back pain has a benign prognosis if recognized and treated early. Low back pain may be disabling and limit everyday activities thus reducing productivity as it could lead to increased absenteeism after delivery [5]. Postpartum

depression is another significant public health issue present in 1 out of 4 women following childbirth [6]. anxiety can become debilitating in new mothers and its incidence ranges from 6.1% to 27.9% in the first 6 months of postpartum [7]. Usual treatment for low back pain is self-care and non-prescription medication such as paracetamol or non-steroidal anti-inflammatory drugs [8]. Non-medical management for low back pain includes interventions such as yoga, physical therapy, Pilates, acupuncture. Physical therapy includes exercises, like, intensive dynamic back extensor exercises, motor control exercises, yoga, and aerobic exercises and pain-relieving modalities such as, short wave diathermy, interferential currents and transcutaneous electrical nerve [9]. Yoga is a mind-body practice originating from ancient INDIA which has also become popular in the west over the last century. Yoga has many branches and styles with varying philosophies and practices, but all are characterized by the integration of physical poses (asana), controlled breathing (pranayama) and meditation (dhyana). Potential mechanism for these changes include improved flexibility and muscular strength derived from practicing the physical poses of yoga, increased mental and physical relaxation derived from practicing controlled breathing or meditation exercises, and improved body awareness gained through both the physical and mental aspects of Yoga [10].

Methodology

The present experimental study was conducted at MGM hospital for women and children, kalamboli, Navi Mumbai. Primigravida postpartum females 6 weeks post normal vaginal delivery in the age group of 21- 40 year who had perinatal and/or postnatal low back pain with pain intensity below NPRS 5 were included in the study. Participants who had undergone lower section caesarean surgery, had complications during their pregnancy (e.g. Preeclampsia), with diastasis recti, with specific low back pain, with ongoing pathologies, with known major medical/surgical history and participants taking analgesics prescribed for low back pain were excluded from the study. Forty primigravida postpartum women in the age group of 20-26 years were recruited via purposive sampling technique. Participants who fulfilled the inclusion criteria were given an information sheet. Females who were unable to read, were explained the purpose of the study in the language best known to them. A written signed informed consent was sought for the same. The participants were randomly allocated in two groups: intervention or control group, using the chit method.

Procedure

Demographic details including name, age, weight, height and occupation were sought for each participant followed by a detailed clinical examination prior to intervention that included:

Pain intensity assessment: Pain intensity was measured by using numerical pain rating scale, it consists of a segmented numeric version in which a respondent selects a whole number (0-10) that best reflects the intensity of his/her pain. The common format is a horizontal 11-point numeric scale ranging from '0' representing no pain to '10' representing the maximal pain.

Physical function assessment: Physical function was assessed using modified Oswestry Disability Index. The questionnaire consists of 10 sections evaluating different functions. Each item is scored from 0 to 5 with higher values representing greater disability. Participants were asked to mark their score for the particular function, then total sum was calculated and divided by fifty and was calculated as percentage of disability. The functional status was assessed on 1st data pre-data point, 4th week, 8th week and 12th week.

Psychological function assessment: Participant's attitudes and underlying beliefs about back pain were measured using the 10-item back pain attitude questionnaire where participants were asked to mark the options (true / false) according to their attitude and belief regarding recovery from back pain. It was assessed on 1st pre data point, 4th, 8th and 12th week. Anxiety was measured using the Hamilton anxiety rating scale. Each item is scored from 0 to 4 with higher values representing higher severity of the symptoms. Participants were asked to mark their score for the particular feeling/ symptom, then total sum was calculated. It was

assessed on 1st pre data point, 4th, 8th and 12th week. Depression was measured using the Hamilton depression rating scale. It contains a total of 21 areas, but the score is calculated based on the first 17 answers. The participants were asked to mark the most suited answer for each area to rate the severity of depression. It was assessed on 1st pre data point, 4th, 8th and 12th week.

Quality of life: Was measured using the WHOQOL- bref scale where the participants were asked to mark the options (from very poor to very good) for the 26 questions assessing 4 domains. A raw data was obtained and a transformed score was calculated thereafter. After initial assessment 20 participants were given a 12-week intervention home based yoga program and 20 participants were given ergonomic advises, patient education- postural and psychological.

Intervention

Intervention group: Yoga asana, pranayama and meditation were taught by a certified trained yoga practitioner on the first day in MGM hospital for women and children, kalamboli and participants were asked perform the protocol for a period of 12 weeks, 3 days a week. Protocol for the first session: 3 repetitions of pawanmuktasana with 20 seconds hold with a rest period of 10 seconds between each repetition. 5 repetitions of anulom vilom, followed by 3 repetitions of dandasana with 20 seconds hold and rest period of 10 seconds between each set. 5 repetitions of anulom vilom followed by 3 repetitions of chaturanga dandasana for a minimum of 5-10 seconds hold and a rest period of 10 seconds between each set. 5 repetitions of anulom vilom, followed by 5 minutes of meditation. A home program was provided, followed by reassessment for pain intensity, physical and psychological functions on 4th, 8th and the 12th week. Progressions were given as increase in repetitions or hold time of each Yoga pose, pranayama and meditation. 4 participants were followed up the next day since they had difficulty in learning the asana. All the participants had difficulty in maintaining the chaturanga dandasana for more than 10 seconds in the first week of the protocol and were asked to perform it to their maximum potential. By the end of 2 weeks, a 20 second hold was possible for 34 out of the 40 participants. 6 participants were comfortable holding chaturanga dandasana for 20 seconds by the end of the 3rd week of protocol administration. The reassessment dates were synchronized with the immunization schedule of the children provided by Indian academy of pediatrics to avoid inconvenience to the new mothers, caused by frequent hospital visits, transportation difficulties, and apprehension due fear of compromise in childcare needs. This schedule helped to improve the adherence rate. The participants were asked to maintain a diary which was reviewed every week through photos and additional reminder calls were given every alternate day.

Control group: Standardized ergonomic advises, postural education, patient education and personalized psychological education was given to the participants in the control group. Reassessment for pain intensity, physical and psychological function was done on 4th, 8th and the 12th week.



Fig 1: 24 years old female performing dandasana in long sitting position



Fig 2: 24 years old female performing pawan muktasana in supine position



Fig 3: 24 years old female performing chaturanga dandasana in prone on all fours



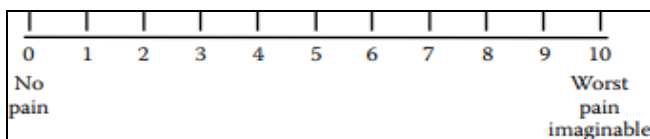
Fig 4: 24 years old female performing anulom vilom in cross leg sitting position



Fig 5: 24 years old female performing meditation in cross leg sitting position

Outcome variables

Pain intensity- It was measured using numerical pain rating scale (NPRS)- It is a commonly used measure to assess pain level in individuals. It is considered as a valid and reliable tool for assessing pain level ($r=0.96$, $icc= 0.86-0.95$) [11].



Physical function: It is recorded using modified Oswestry low back pain disability questionnaire- It is the most commonly used disability scale for people with low back pain. The questionnaire examines 10 functions. Disability in each function is scored from 0 to 5, with higher values indicating greater disability. The score is calculated by dividing the total score by 50 (if all sections are attempted) followed by multiplication with 100. The final score is expressed as percentage ($r=0.83$, $icc=0.84-0.94$) [12].

Attitudes and belief of the patients regarding low back pain: It was assessed using back pain attitude questionnaire. The 10-item short form of back PAQ is used to measure changes in beliefs, or as a screening tool to predict outcome or direct management based on attitude and belief. It has 10 items each item is rated on a 5-point Likert scale ranging from 'false' to 'true'. Patient responses are recorded from -2 (true) to 2 (false). Scores range from -20 to 20 with negative scores reflecting beliefs that are unhelpful to recovery, with reliability ($r = 0.73$) and internal consistency internal consistency was ($\alpha=0.61$; 95%ci 0.56 to 0.66) [13].

Anxiety-Hamilton anxiety rating scale: Was used to assess anxiety in postpartum women. It is a clinician-based questionnaire; which is used as a self-scored survey. It consists of 14 symptom-defined elements, and caters for both psychological and somatic symptoms, comprising anxious mood; fears; insomnia; 'intellectual' (poor memory/difficulty concentrating); depressed; somatic

symptoms; cardiovascular; gastrointestinal; genitourinary; autonomic and observed behavior at interview. Each item is scored on a basic numeric scoring of 0 (not present) to 4 (severe): $>17/56$ is taken to indicate mild anxiety; 25–30 is considered moderate–severe. ($r= 0.79- 0.86$, $icc= 0.51$) [14]

Depression: Depression was evaluated using Hamilton depression rating scale- It is a clinician-administered depression assessment scale containing 17 items pertaining to symptoms of depression experienced over the past week. A score of 0–7 is considered to be within the normal range, a score of 8-13 indicates mild depression, 14-18 denotes moderate depression, 19-22 signifies severe depression and a score more than 23 implies very severe depression. ($icc= 0.73$) [15]

Quality of life: The world health organization quality of life (WHOQOL) –bref scale was utilized to calculate quality of life. It is an abbreviated version of the whoqol-100 developed by the WHOQOL group with fifteen international field centers, simultaneously, in an attempt to develop a quality of life assessment that would be applicable cross-culturally. It contains a total of 26 questions based on a four-domain structure: physical health, psychological, social relationships and environmental. Domain scores are directly proportional to quality of life.

Results

Analysis was carried out using statistical tool IBM SPSS version 23. Statistical significance was set as $p \leq 0.05$ and confidence interval was set at 95%. Measures of central tendency and dispersion were calculated and reported as mean and standard deviation. As data were ordinal scales, normal distribution non-parametric tests were applied for further analysis. Non-parametric test in form of Wilcoxon signed rank test was performed for intra Group analysis pre–post intervention for pain intensity, physical and psychological function. Inter-group comparisons for pain intensity, physical and psychological function for 2 groups were measured by calculating effect size.

Table 1: Mean and SD of outcome variables in intervention and control groups

Outcome variables	Intervention group N= 20			Control group N= 20		
	Pre-mean (SD)	Post mean (SD)	Effect size	Pre-mean (SD)	Post Mean (SD)	Effect size
Pain intensity						
Pain intensity (cm)	3.75 (0.91)	0.75 (0.55)	4.11	3.55 (0.99)	1.05 (0.76)	2.86
Physical function						
Modi (%)	31.10 (10.55)	15.80 (6.71)	2.77	32.70 (7.52)	20.20 (4.85)	2.02
Psychological function						
Back PAQ	3.85 (3.47)	15.10 (1.77)	4.30	5.40 (2.14)	14.85 (1.75)	4.86
Ham a	14.45 (4.51)	7.00 (3.16)	1.94	16.25 (4.18)	8.05 (2.98)	2.29
Ham d	12.10 (2.97)	4.70 (1.63)	3.22	12.55 (2.70)	8.15 (2.35)	1.74
Quality of life						
Bref- physical	53.80 (6.27)	68.65 (6.40)	2.34	50.35 (6.45)	56.90 (6.51)	1.01
Bref- Psychological	52.9 (6.32)	68.35 (7.56)	2.23	47.00 (5.68)	59.80 (7.05)	2.01
Bref- social Relations	71.60 (6.83)	86.00 (7.71)	1.98	60.20 (11.51)	72.50 (25.87)	0.66
Bref- Environmental	65.80 (7.42)	75.00 (5.15)	1.46	67.65 (8.19)	77.10 (4.47)	1.49

Intra group comparison: Intervention group

Yoga intervention of 12 weeks was administered to 20 postpartum women. Post 12- week intervention, score on NPRS showed that pain reduced significantly (p=0.0). Pain intensity reduced by 3.0 cms (p= 0.00, 95% confidence interval (ci)). The most affected components of the modified oswestry disability index were pain intensity, lifting, sitting, standing and walking. Post intervention score for physical function showed that disability reduced significantly by 15.66% (p = 0.00, 95% ci). Post intervention score for psychosocial factors (attitude and beliefs) on back PAQ scale, showed that attitude and beliefs regarding back pain improved 3.85 to 15.10. Post intervention score for psychological factors such as anxiety, depression and quality of life showed that anxiety and depression significantly reduced and quality of life improved. Anxiety scores significantly reduced with a mean difference of 7.4 (p=0.00) and depression scores reduced with a mean difference of 7.4 (p=0.00). Quality of life scores in the four domains of physical health, psychological health, social relations and environmental improved by a mean difference of 14.85, 15.45, 14.40 and 9.20. (p=0.00, 0.00, 0.00, 0.00) respectively.

Control group

Ergonomic and postural advises along with patient education, and positive reinforcements for psychological support were administered to 20 postpartum women. Post

intervention, NPRS scores reduced significantly by 2.5 cms (p=0.00, 95% ci). Physical functioning, measured by MODI showed a significant improvement by 12.50 % (p = 0.00, 95% ci). Back pain attitude questionnaire scores improved from 5.40 to 14.85 (p= 0.00, 95% ci). Psychological function, including anxiety, depression and quality of life showed significantly differences. Anxiety scores reduced by a mean difference of 8.20 (p=0.00) and depression scores reduced by a mean difference of 4.4 (p=0.00). The quality of life scores in the four domains of physical health, psychological health, social relation and environmental improved by a mean score of 6.55, 12.8, 12.30 and 9.45 (p=0.00, 0.00, 0.01, 0.00) respectively.

Inter group comparison: Effect size of pain intensity was greater in intervention group (4.1) than control group (2.8). Greater improvement in physical function was observed in intervention group (2.7) as compared to control group (2.0). Attitudes and beliefs regarding back pain improved equally in both, intervention (4.30) and control (4.86) groups. Out of all the psychological functions, yoga had the greatest effect on depression (3.22) and an almost equal effect on anxiety (1.94), and quality of life (physical- 2.34, psychological- 2.33, social relations- 1.98 and environmental- 1.46). Anxiety and psychological domain of quality of life improved the most in the control group (2.29, 2.01 respectively) followed by depression and quality of life as mentioned in table 4.6

Table 2: Pre-intervention – Post intervention analysis for intervention and control groups

Variables	Intervention N= 20		Control N=20	
	Mean difference	P value	Mean difference	P value
Pain intensity (NPRS in cms)	3.00	0.00	2.50	0.00
Physical function (MODI %)	15.30	0.00	12.50	0.00
Psychosocial factors (back PAQ)	11.25	0.00	9.45	0.00
Anxiety (HAM A)	7.45	0.00	8.20	0.00
Depression (HAM D)	7.40	0.00	4.40	0.00
Quality of life (physical- bref)	14.85	0.00	6.55	0.00
Quality of life (psychological- bref)	15.45	0.00	12.8	0.00
Quality of life (social relation- bref)	14.40	0.00	12.30	0.01
Quality of life (environmental- bref)	9.20	0.00	9.45	0.00

Key: NPRS- numerical pain rating scale; MODI- modified oswestry disability index; back PAQ- back pain attitude questionnaire; ham a- Hamilton anxiety rating scale; ham d-

Hamilton depression rating scale; bref- world health organization quality of life bref rating scale.

Discussion

Current study aimed to assess effectiveness of yoga on low back pain intensity, physical and psychological function in postpartum women. The results of this study imply that pain intensity, physical and psychological (anxiety, depression and quality of life) function demonstrated improvement with yoga intervention as compared to control group. Postpartum back pain may result from increased weight during pregnancy which, changes the center of gravity, disturbs normal posture and increases lumbar curvature^[8] and other factors such as history of back pain during pregnancy, younger age and greater body weight and shorter stature^[16]. anatomical and physiological changes occur during pregnancy, especially increased secretion of relaxin hormone, which increases laxity of joints and changes the mechanics of musculoskeletal system^[17]. resultant ligament laxity and joint hypermobility can be long lasting and place further strain on the back. Abdominal muscles are stretched throughout pregnancy, leading to loss of strength and tone of the abdominal corset. Abdominal muscle weakness is compensated by overworking Para spinal and hip muscles. Combination of reduced mechanical control, increased elasticity of ligaments and muscle imbalance will render the back much more susceptible to injury. Low endurance of back and hip muscles has been reported in women with long standing low back pain after pregnancy and was indicated that muscular insufficiency may be an important factor regarding persistent problems^[13]. Yoga intervention demonstrated 29% reduction in pain intensity whereas in control group it was 24% Physical disability reduced by 52% in intervention group and 50% in control group. Significant reduction of pain and improvement in physical function was observed in both the groups. In the intervention group, where participants performed a 12 week home based yoga protocol, potential mechanism for these changes include improved flexibility and muscular strength derived from practicing the physical poses of yoga and improved body awareness gained through both the physical and mental aspects of yoga and behavioral and psychological changes such as increased awareness of mental and physical states which may help change the perception of pain in patients. Physiological changes like, decrease in sympathetic nervous system activity, reduction in inflammatory markers and stress markers and increase in flexibility, strength, circulation and cardio respiratory capacity are known to alter pain experience of the patients^[18]. In control group, which received patient education, ergonomic and postural advices, positive psychological reinforcement, there was a significant decrease in pain levels. These changes could be attributed to the fact that psychosocial factors, including fear- avoidance behavior, low mood/withdrawal, expectation of passive treatment, and negative pain beliefs such as catastrophizing, have been known to be risk factors for the development of chronic low back pain. Physiological pain with organic insult can further have negative effects on emotions and cognitive function, and conversely, a Negative emotional state can lead to increased pain through the central pain pathway.¹⁸ tatsunori ikemoto and colleagues studied psychological treatment strategies for chronic low back pain and concluded that reassurance to patients, restructuring the negative cognition of the patient into realistic appraisal, mindfulness and self-management strategies with appropriate goal setting and pacing theory may help improve pain acceptance and long-

term pain-related outcomes in patients with chronic non-specific low back pain^[18]. Also, delayed postpartum phase which can last up to 6 months, is the phase when the body returns to pre pregnant state^[1]. This could be a possible reason for the pain reduction in this group. Various factors, such as previous adverse life experiences, history of prenatal depression, prenatal anxiety, sociocultural roles, psychological attributes, coping skills, impaired infant-mother interactions, lack of social support, financial and/or marital stress, and adverse life events are known to influence the risk for major depressive disorder. Sleep disturbances due to pregnancy and due to childcare during puerperium compound the risk for depression, and possibly the risk of lumbo pelvic pain. Disturbed sleep has been shown to result in increased musculoskeletal pain, tenderness, and fatigue in healthy people. These reports demonstrate the vulnerability of women in the childbearing years to pain and depression^[28]. The mean percent change in psychological function in intervention group was, anxiety- 6.23%; depression- 24.5%; and quality of life- physical: 12%, psychological:12%, Social relations: 9.5% and environmental: 11.2%. Improvement in the psychological functions was noted to be significant in both the groups. Potential mechanism for these changes includes, increased mental and physical relaxation derived from practicing controlled breathing or meditation exercises. The results align with the results of a systematic review conducted by intan hajar fauzanin and colleagues which demonstrated that yoga can be helpful for postpartum women to alleviate symptoms of depression. Shohani *et al.* Conducted a study, which proved yoga has an effective role in reducing stress, anxiety, and depression that can be considered as complementary medicine and reduce the medical cost per treatment by reducing the use of drugs. Analysis of overall effect indicated that yoga intervention significantly reduced the level of maternal depression during pregnancy and decreasing postpartum depression risk (newham *et al.*, 2014). The reason yoga is more effective than patient education, ergonomic advices and postural orientation may be because Yoga practice includes kinesthetically aware body movement through asanas, mindful breathing and relation through pranayama and dhyana. These, together, promote deeper relaxation which could be attributed to the bidirectional communication between musculoskeletal, mental and nervous systems. Yoga is a safe and effective treatment that can be learnt and performed at home without supervision thus making it one of the ideal therapy for postpartum low back pain.

Conclusion

The aim of the present study was evaluating the effect of yoga on multifaceted low back pain, physical as well as psychological disability experienced by postpartum women as it could be debilitating and might lead to permanent disability if not addressed soon. Results of the present study demonstrated that 12week yoga intervention was effective in improving all three aspects. Pain intensity was reduced by 29%; 50% improvement in physical and overall psychological function in women with postpartum low back. Attitudes and beliefs regarding low back pain improved in both the groups by 30%. Anxiety in new mothers improved more with patient education than with yoga. Health related quality of life increased significantly in postpartum women practicing Yoga.

Conflict of interest: Nil**References**

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