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Effectiveness of back-stretch exercise on back pain among pregnant women

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Abstract

Background: Back pain (BP) could be present either as a pelvic girdle pain between the posterior iliac crest and the gluteal fold or as a lumbar pain over and around the lumbar spine. The management aims to reduce the discomfort and the impact on the pregnant woman's quality of life.
Purpose: The study aimed to determine the effect of back-stretch (BS) exercise on the perception of BP during pregnancy.
Design and methods: A quasi-experimental pretest-posttest control group research design was used. The study was conducted in Gottigere health center, Bangalore, Karnataka, India. The BS exercise intervention was provided to the mothers of the study group. Data were collected from 60 antenatal mothers, 30 in the study, and control group, respectively who were in their 28-32 weeks of gestation by using a non-probability purposive sampling technique. The intensity of BP was estimated using the visual analogues scale.
Findings: The comparison between the study and control group has proved a remarkable BP reduction among the antenatal mothers after BS exercise in the study group. The post-test mean intensity of BP was lesser than the pre-test mean intensity of BP (48.73< 54.83) among mothers of the study group (P≤0.001). The antenatal mothers of the control group did not have a statistically significant reduction in the level of BP.
Conclusion: The BS exercise is effective in reducing BP among antenatal mothers during their antenatal period.

Keywords: low back pain, back-stretch exercise, antenatal mothers, second-trimester pregnancy.

1. Introduction

Back-pain (BP) affects more than two-thirds of women during pregnancy. Pregnancy-related BP typically affects the lower back. BP during pregnancy is not a surprising fact. However, attention should be given to women to alleviate BP during the early stages of pregnancy. Hormonal and postural changes contribute to BP during pregnancy. As the fetus grows, the spine and muscles strain to carry the additional weight during pregnancy. During the first trimester, the progesterone hormone relaxes the muscles and ligaments near the pelvis. The relaxin hormone prepares the body for labor through loosening the ligaments in the pelvis and by softening and widening the cervix. Thus, pregnant women are less stable and prone to develop BP. [1]

The BP associated with pregnancy is related to mechanical factors such as increased abdominal girth, postural change, and also due to the emotional stress causing tightening of the muscles in the back.[2] Weight gain during pregnancy can contribute to low BP during pregnancy. Many studies also advocated that pubic symphysis problems and postural change shifts move the body's gravity to the center leading to lordosis.[3]

Low back pain (LBP) and pelvic girdle pain (PGP) are the two common types of pain during pregnancy. However, very few women suffer from combined pain during pregnancy. PGP is a concern for pregnant women and postnatal mothers as it is more prevalent like lumber pain (LP). This type of pain is generally unilateral or bilateral, recurrent, or continuous which occurs between the posterior iliac crest and gluteal fold. The pain radiates to the posterior lateral thigh, knees, calf but not to the foot.[4] The PGP and LBP are usually differentiated by carrying out negative active straight leg raise test and positive posterior pain provocation test.[5]

Most of the studies reported that more than 50% of pregnant women suffer from LBP and one-third of them experience severe pain which affects the quality of life of pregnant women.[6] Around 80% of pregnant women reported that the low BP alters their daily routine, 20% of them said that they are unable to carry out their daily work.[7] Low BP generally begins during the 20th to 28th weeks of pregnancy. However, the duration of BP varies depending on the lifestyle of the pregnant women. It was reported in another study that 38% of pregnant women continued to experience PGP even 3 months after the delivery. Also, it was reported that 13.8% of women experienced BP until one year.[8]The available literature informs us that LBP is a potential risk factor leading to poor social interactions and extended maternity leave.[9]

Generally, BP is inevitable during pregnancy. However, it can be relieved during and after pregnancy through various strategies. The ways to relieve BP during pregnancy include stretching the lower back regularly, sleeping on the sides with a pillow between the legs and below the abdomen, warm compress to reduce inflammation and to relax the tight muscles, standing and sitting upright, providing extra back and abdominal support, having back support while sitting, prenatal back massages, chiropractic and acupuncture management, adequate sleep and stress reduction through meditation.[10]

Though many of the above mentioned strategies help to alleviate low BP during pregnancy, regular exercise during pregnancy strengthens the back and stretches the muscles that support the back. The regular exercises promote good posture. These exercises ease BP and prepare

pregnant women for labor and childbirth. Many epidemiological studies have proved the effectiveness of exercise on lowering BP. The benefits of exercise during pregnancy are numerous. By doing exercise, the cardiovascular function improves in pregnant women.[11] The risk of developing gestational diabetes decreases.[12] The strength of lean muscle mass improves. Exercise enhances sleep and improves the sense of wellbeing. The additional benefits of exercise include a reduction in bone density loss, reduction in physical discomfort, and improved anaerobic ventilatory threshold.[13] Benefits to the fetus include improvement in the viability of the placenta[14] and decreased resting fetal heart rate.[15-17]

Few studies have been conducted to determine the effectiveness of stretching exercise on BP among pregnant women. Effect of sitting pelvic tilt exercise on relieving BP among primigravida women during their third trimester was studied. Pain intensity was measured using a visual analogue scale (VAS). The results of the study revealed that the mean BP in the experimental group was significantly lower than in the control group. Therefore, the study concluded that sitting pelvic tilt exercise decreased the BP intensity without the incidence of low birth weight, preterm labor, and neonatal complication.[18]

The effectiveness of stretching exercise in reducing BP among antenatal mothers was studied in 2017. Modified Roland Morris BP questionnaire was used to assess the BP. Stretching exercise was demonstrated and the pregnant women were made to practice the exercise for two weeks. The results of the study showed that stretching exercise was highly effective in reducing BP among pregnant mothers with BP. [19]

A meta-analysis on the effect of exercise on lowering BP in pregnant women was done in 2017. The meta-analysis included 11 randomized controlled trials which consisted of 2347 pregnant women. The results of the meta-analysis reported that exercise reduced the ~~low~~ BP in pregnancy by 9%. Furthermore, the exercise prevented new episodes of sick leave due to lumbopelvic pain.[20]

The methods of pain relief adoption vary in each woman. Every woman gets partial pain relief using one or more pain relief measures. Though many methods are available for BP relief, back-stretch exercise has numerous benefits. Stretching exercise helps in toning the perineal area, it stretches the ligaments and strengthens the inner thighs and abdominal muscles. By doing this, the body alignment is maintained thereby the BP is reduced.[21] The above-mentioned studies signify the need for conducting the present study. There is very limited literature available on the effect of stretching exercise on BP among pregnant women in India. In order to expand the knowledge in this area and to generalize the research findings, the investigators aimed to determine the effectiveness of back-stretch exercises on BP among pregnant women.

2. Materials and methods

Lenz and Anna Maxwell's middle-range theory of unpleasant symptoms was applied to this study to achieve the effect assuming that pain may be due to physiological, psychological and situational factors and the exercise will be effective in alleviating pain and improving the quality of life .[22]

A pre-test post-test control group research design was adopted in this study and the study was conducted in Gottigere health center, Bangalore, Karnataka, India for 3 months. During the study period, the registered antenatal mothers were 213, out of which 115 were in 28-32 weeks of gestation. A total of 60 eligible samples were selected by using a non-probability purposive sampling technique. As the study duration was limited only for three months and the available samples were less, the randomization could not be done in the study. Purposively, 30 samples were assigned to the study, and 30 samples to the control group. The inclusion criteria of the study included the women in 28-32 weeks of gestation, both primi and multi gravid women, pregnant women who were experiencing severe BP, women who were willing to participate in the study, and the women who were available till the delivery. Women with medical/ obstetrical complications, women below 28 weeks of gestation, women with comorbid diseases, disc pathology, radiculopathy, kyphosis, lordosis, scoliosis, and deformities were excluded from the study. Researchers identified the eligible participants based on the inclusion and exclusion criteria.

Before initiation of the study, permission was obtained from the research and ethics committee of Amrith Educational & Cultural Society (A.E.C.S. Maaruti College of Nursing) and District health and family welfare officer, Bangalore, India to conduct the study. Following a detailed description of the research procedures, written informed consent was signed by the participants. In addition, it was explained that their participation was voluntary and that they could leave the research at any moment without giving a reason.

Socio-demographic information having 10 variables were assessed. BP intensity was analyzed using the VAS (0-100 mm) scale.[23] It was rated on the scale as 0 – 1 mm point indicating no pain, 1 mm – 25 mm indicating mild pain, 26 mm – 50 mm indicating moderate pain, 51 mm – 75 mm indicating severe pain and 76 mm – 100 mm indicating worst pain. The validity of the standardized VAS is 0.95.

After estimating the pain, the women of the study group were asked to stretch the back for 3-4 seconds then to relax and then to lay on the floor with knees up and feet flat with soles of feet. The backside, mid/ upper back, shoulders, and head were touching the floor, and the women were asked to maintain a space between the floor and low back as well as neck. Slow inhalation was encouraged to bring it to the abdomen, then towards the back and then were asked to exhale out slowly. The women were asked to continue the pulling and allowed the spine and pelvis to return to their original position. The women were advised to do the same at least 4 times a day for 5-10 minutes and to stop the exercise in case of excessive fatigue, shortness of breath, feeling faint, difficulty in walking, marked decrease in movement of the baby, and dizziness. Participants were motivated to perform the exercise in the morning and mid-afternoon under the supervision of the researcher as the researcher visited the pregnant women in their home every day. However, the pregnant women were reminded through a telephonic call to perform the exercise for the remaining two times a day. Further reinforcement was done by the researchers when the women visited the antenatal OPD during their subsequent visits. The control group continued the routine care.

The women of the study group were advised not to use any other strategies to relieve BP to prevent the influence of extraneous variables on the outcome of the study. A stretching exercise practice checklist was asked to be maintained by pregnant women. It was counter checked by the investigators of the study. No attrition of participants was observed in the study.

The post-test was conducted after 3 months. The data were analyzed using descriptive and inferential statistics. Frequency, percentage, mean, median, mode, standard deviation was used as descriptive statistics. Paired 'T' test was used to find out the effectiveness of BS exercise in decreasing the intensity of BP among pregnant women. 'Chi' square test was done to determine the association between demographic variables and the intensity of BP. The level of significance was set at $P \leq 0.001$ level.

3. Results

Our study determined the effectiveness of back-stretch exercises on BP among pregnant women. In our study, the majority of women in the study group (53%) and 70% in the control group belonged to the age group of 21-25 years. 63% of women in the study group and 54% of women in the control group completed higher secondary education. Most of the women in both the study and control group were housewives ie, 80% and 77% respectively. In our study, most of the women of the study (77%) and control group (83%) had family income ranging between Rs. 4000 – 8000. In both groups, 53% and 57% of pregnant women were primipara women. All the women of the study group and control group were enrolled in their 28 weeks of gestation.

The height of the women ranged from 154 – 158 cm in 60% of women of the study group and 57% of women of the control group. The antenatal women's weight ranged from 54 – 58 kgs in 60% of women in the study group and 54% of women in the control group. 87% of women in the study group and 80% of women in the control group did not have a previous history of BP. The majority of women in both groups did not get any previous information related to the strategies to minimize BP during pregnancy.

The mean and SD of the level of BP in the study and control group are presented in Table.1. The women of study group having moderate pain had a mean of 47.9 and SD of 2.2 in the pre-test, whereas they had a mean of 45.4 and SD of 3.7 in the post-test. The calculated t value was = 3.16, df = 58 @ p=0.0025. In contrast, the women in the control group with moderate pain had the pre-test mean of 47.8 and SD of 2.2. The post-test mean and SD were 48.8 and 1.1, respectively. The calculated t value was = 2.26, df = 58 @ p=0.0273. With respect to severe BP in the study group, the women had a pre-test mean of 58.3 and SD of 4.5 and post-test mean and SD of 55.4 and 3.4, respectively. The calculated t value was = 2.84, df = 58 @ p= 0.0061. However, in the control group, the pre-test severe BP mean and SD was 57.7 and 3.8 and the post-test mean and SD was 58.28 and 4.3. The calculated t value was= 0.55, df = 58 @ p=0.5820.

Table 1. Mean and SD (n = 60) of **the** level of back pain in the study and control groups before and after the intervention.

Level of BP	Study group		Control group	
	Pre-test Mean±SD	Post-test Mean±SD	Pre-test Mean±SD	Post-test Mean±SD
Moderate	47.9±2.2	45.4±3.7	47.8±2.2	48.8±1.1
"t" test	t = 3.16, df = 58, p=0.0025		t = 2.26, df = 58, p=0.027	
Severe	58.3±4.5	55.4±3.4	57.7±3.8	58.28±4.3
"t" test	t = 2.84, df = 58, p= 0.006		t = 0.55, df = 58, p=0.582	

Table 2 outlines the pre-test and post-test scores of the intensity of BP among pregnant women of study and control group. The women of the study group had a significant reduction in the level of BP with a difference in the mean of 54.83 in the pre-test (54.83±6.3) and 48.73 in the post-test (48.73±5.9). However, the women of the control group did not have a reduction in the level of BP in the post-test. In the control group, the pre-test mean and SD was 54.5±5.8 and the post-test mean and SD was 56.7±5.3. The Chi-square test was done to determine the effectiveness of BS exercise on BP at P≤0.001 level. The calculated t value of the study group was 23.08 and for the control group, it was 10.43 (df=29). This informs us that there is a significant difference in the level of BP between the women of the study and control group before and after the intervention. Therefore, our study results showed that BS exercise is most effective in managing BP during pregnancy.

Table 2. Comparison of the pre-test and post-test scores of the intensity of BP among women.

BP score		Mean ± SD	t-Value	df	Level of significance
Study group	Pre-test	54.83±6.3	23.08	29	P < 0.001
	Post-test	48.73±5.9			
Control group	Pre-test	54.5±5.8	10.43		
	Post-test	56.7±5.3			

Table 3 explains the association between the post-test levels of BP with demographic variables of the women in the study group. In our study, there was a significant association between demographic variables such as age and parity with the intensity of BP. The Chi-square value for age is 5.11 (df= 1, Table value 3.84) and it was 14.01 for parity (df=1, Table value 3.84). But the other variables such as education, occupation, income of the family, gestational weeks, height, weight, past history of BP, source of information on back-stretch exercise are not significantly associated with the intensity of BP.

Table: 3 Association between the post-test level of BP with demographic variables of the women in the study group.

Variable	Below Median	Above Median	Chi-Value	df	Table value	Sig.
Age						
21 – 25	10	16	5.11	1	3.84	S
26 – 30	3	11				
Education						
P U C	9	10	1.9	2	5.99	NS
High School	2	6				
Graduate	2	1				
Occupation						
Coolie	0	3	3.146	2	5.99	NS
Home maker	3	11				
Private employee	2	1				
Family Income per month						
4,000 – 8,000	9	10	1.9	2	5.99	NS
Above 8,000	2	6				
Parity						
Primipara	12	4	14.01	1	3.84	S
Multipara	1	13				
Gestational week (w)						
28 – 30	8	8	0.855	1	3.84	NS
30+1d – 33	5	9				
Height (cm)						
154 – 158	7	11	0.35	1	3.84	NS
158 – 162	6	6				
Weight (kg)						
54 – 58	9	9	1.267	2	5.99	NS
59 – 63	4	7				
64 – 68	0	1				
Past history of back pain						
Yes	3	1	1.74	1	3.84	NS
No	10	16				
Source of information						
Health personnel	10	16	1.89	1	3.84	NS
Not heard	3	1				

S: Significant at p<0.001 Level, NS: Not Significant

4. Discussion

Studies have reported that stabilizing exercises significantly reduces BP and increases the quality of life in women experiencing pregnancy-related BP.[24] The studies also have mentioned that exercises reduce BP in postnatal women.[25] These exercises strengthen the paraspinal and

abdominal muscles leading to the stability of the lumbopelvic region. The stabilization of the lumbar spine occurs due to the contraction of transverse abdominis muscles. This in turn reduces the laxity of sacroiliac joints. This facilitates the rehabilitation of patients experiencing low BP.[25, 26] A report of a Cochrane review also reported that the exercise during pregnancy reduces pelvic and BP.[27] Despite the fact that exercise is very important during pregnancy, many women do not exercise, due to the myths or prejudices, faulty dietary pattern, lack of information, the stress in the workplace and lack of support from the family.[28]

In our study, the post-test mean intensity of BP was lesser than the pre-test mean intensity of BP (48.73<54.83) among women of the study group and the obtained 't' value is 23.08 which is greater than the table value t (29, 0.001) at p≤ 0.001 level. The mean of the post-test intensity of BP is higher than the mean intensity of the pre-test (56.7>54.5) among the control group and the obtained 't' value is 10.43) at p≤ 0.001 level. Therefore, it is very evident that stretching exercise was effective in reducing BP in the pregnant women of the control group.

Our study findings are consistent with the findings of another study in which the effect of exercise on BP and lordosis in pregnant women was assessed using the Roland–Morris questionnaire. The participants of the study group were trained on seven exercises with relaxation movements. The pregnant women performed those exercises three times per week for eight weeks until 24 weeks of pregnancy. The training included preparation, walking, stretching, strengthening, and relaxation exercises. The control group participants followed the routine care and did not perform any exercises. The study results illustrated that lordosis was greater in the control group than in the study group. The severity of BP reduced in the study group and increased in the control group after two months. Therefore, it is evident from the results of this study that exercise during pregnancy reduces BP in antenatal mothers.[29]

A clinical trial compared the effect of back-stretch exercise and usual care on BP and lordosis in the second trimester of pregnancy. Quebec BP questionnaire was used to assess the pain. The study reported that BP was significantly decreased in the intervention group at P < 0.001 level. However, the pain significantly increased in the control group (P = 0.025). Therefore, the use of exercise is highly recommended to prevent and treat BP during pregnancy. [30]

The current study provided empirical evidence that pregnant women irrespective of their parity, age, education, weight, gestational week, and prior knowledge, suffer from BP during pregnancy and the results reveal that BS exercise has a positive impact on reliving BP. Our study concluded that BS exercise was effective in reducing BP than the routine care in pregnant women.

The study did not assess any other feto-maternal parameters to ensure the safety of exercises. The level of acceptability and satisfaction of mothers was not included in the study. The outcome of the type of delivery was not measured in the study. The antenatal women could not be followed up continuously to monitor their practice of BS exercise during their pregnancy. As the samples were selected only from one setting, the results might not be generalizable. The authors recommend conducting a similar study on larger sample size, a study only among the primi mothers, and a comparative study to compare BS exercises with another alternative method to reduce BP.

5. Conclusion

Our study concluded that back-stretch exercise was effective in relieving BP among antenatal women. Therefore, the authors recommend that back-stretch exercise guidelines should be developed and given to all the pregnant women to alleviate BP and to improve their quality of life.

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Conflict of Interest

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