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Effectiveness of Exercise on Reducing the Intensity of Low Back Pain in Pregnant Women during 2nd Trimester of Pregnancy

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Abstract: ***Background:*** ***The low back pain during 2nd trimester of pregnancy is the common issue among pregnant women that raises the need for mandatory exercise program in the reduction of low back pain and changes in kinematics of spine.*** ***Purpose:*** ***of this study to find out the effect of exercise program in reduction of low back pain in pregnant women between 18 and 35 years.*** ***Materials and methodology:*** ***Thirty subjects aged between 20-35 years pregnant females who have low back pain during 2nd trimester is selected from Dr. Sengaliappan Nursing Home, Saibaba Colony and group A (15 subject) participated in an exercise program three time a week for 12 weeks and group B (15 subjects) as control group received only standard antenatal exercise. The outcome was measured by using Oswestry low back pain disability questionnaire (for assessing the low back pain), Trunk side bending test (for assessing the kinematics of spine) and Pregnancy mobility index (for assessing the mobility status of pregnant women).*** ***Results:*** ***The results conclude that group A, who underwent abdominal strengthening exercise, hamstring strengthening exercise, hip flexor stretching exercise and paravertebral muscles stretching exercise are more effective in reducing the intensity of low back pain than Group B who underwent only standard antenatal exercise.*** ***Conclusion:*** ***It concluded that the patients who underwent exercise program of abdominal strengthening, hamstring strengthening, hip flexor stretching and paravertebral muscle stretching has significant reduction in intensity of low back pain and significant effect on flexibility of spine. And hereby we conclude that when the low back pain is reduced, the flexibility of spine is increased.***

Keywords: low back pain, Oswestry low back pain disability questionnaire, Trunk side bending test, Pregnancy mobility index, Trimester, pregnancy, flexibility, kinematics

1. Introduction

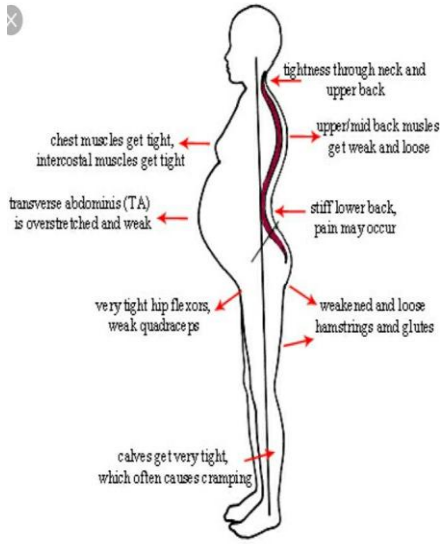
Low back pain is the major problem among women during pregnancy and it has a great impact on their quality of life. Low back pain during pregnancy has been recognized and described by Hippocrates, Vesalius, pine an, Hunter, Velpeau and many others. The prevalence of pregnancy related low back pain from 25% to 90%. It is common in the 2nd trimester and 3rd trimester of pregnancy. The female body undergoes many hormonal and anatomic changes which affect musculoskeletal system during pregnancy period. The abdominal muscles have to stretch in width and length to accommodate the growing uterus. The two sides of the rectus abdominis, obliques, and transversus abdominis expand and, in some cases, may separate by 3-6 inches. It creates lumbar lordosis which causes a shortening of the spinal extensors, lengthening of the abdominals and hip flexors. Studies have shown that during pregnancy the abdominal muscles become insufficient. Exercises during pregnancy have been shown to improve maternal fitness and wellbeing. But very few studies have evaluated the efficiency of exercises during pregnancy on increasing the core abdominal muscle strength. Local core muscle consists of transverse abdominis, multifidii, pelvic floor muscles and diaphragm. It is observed that there is a correlation between core muscle strength and incidence of low back pain. Several studies have shown that at least 50% of women experience some kind of back pain during some period of pregnancy. The etiology and pathogenesis of back pain related to pregnancy is unclear. Most hypotheses have been focused on changed load resulting from increased weight and decreased stability of the pelvic girdle due to hormonal changes.

Some studies have revealed a correlation between circulating levels of the hormone relaxin and pelvic pain in pregnancy; while others have found no such correlation. The three factors related to the development of back pain were abdominal sagittal diameter, transverse diameter and depth of the lumbar lordosis. Ostgaard et al. showed that rate of these complications in athletic women was less than nonathletic women. Meanwhile it is unclear in non-athletic pregnant women if exercise can reduce the intensity of low back pain. The study shows that no strong evidence exists concerning the effect of physical therapy interventions on the prevention and treatment of back and pelvic pain related to pregnancy. It is suggested in Cochrane review done on interventions for preventing and treating pelvic and back pain in pregnancy that more research in areas of education in early pregnancy on specially-adapted exercises, preventive studies beginning early in pregnancy will be helpful. Thus the purpose of the current study is to find out whether core muscle strengthening helps in prevention of low back pain. If not there is a scope of further research in formulating better exercise programs for this population. The main causes of back pain during pregnancy are

- **Weight Gain**- There is 5-10kg increase in body weight. The spine has to support that weight. That can cause lower back pain. The weight of the growing baby and uterus also

puts pressure on the blood vessels and nerves in the pelvis and back.

- **Posture Changes**-Pregnancy shifts the centre of gravity. As a result, they may gradually even without noticing begin to adjust their posture and their gait. This may result in back pain or strain.
- **Hormonal Changes**-During pregnancy, our body makes hormones called relaxin that allows ligaments in the pelvic area to relax and the joints to become looser in preparation for the birth process. The same hormone can cause ligament that support the spine to loosen, leading to instability and pain.
- **Muscle Separation**-As the uterus expands, two parallel sheet of muscles,(the rectus abdominis muscles) which runs from the ribcage to the pubic bone may separate along the centre, and this separation may worsen the pain.
- **Stress**-Emotional stress can cause increase muscle tension in the back, which may be felt as back pain or back spasms.



Pregnancy is also known Gravidity or gestation. The pregnancy occurs in the fertile period of the female. It is followed by giving birth to their offspring around 40 weeks from the last menstrual period and ends in child birth. Exercise is natural part of life. Physical exercises increase the mood elevation chemicals in the brain and thereby reduce pregnancy related problems. As the women need to exercise during pregnancy for the facilitation of easy labor. Safe maternity with improved neonatal outcome is predicted on proper antenatal care services. Common issue during pregnancy can include low back pain, sciatica, carpal tunnel syndrome, sacroiliac joint pain, pelvic floor weakness and urinary incontinence. These problems can be attributed to the change in posture, due to the forward shift in centre of gravity and associated weight gain and pregnancy related hormones. Some of these complaints may continue after giving birth as well as the development of diastasis recti, separation of the superficial abdominal muscles. A number of factors contribute to muscle and joint problem during pregnancy. These include exaggeration of lumbar lordosis, weakening of the pelvic floor and lower abdominal area.

Exercise has become fundamental aspects of women's lives and an important constituent of antenatal care. Back pain affects the activity of daily living. Prevention and treatment of low back pain related to pregnancy would thus has considerable implications for women themselves and for the society in terms of quality of life, public health costs and productivity.

Exercise is becoming increasingly popular during pregnancy. One goal of exercise during pregnancy is to restore optimal biomechanics. Lumbar pelvic stabilization may be achieved by exercise aiming at appropriate posture and enhanced muscle function. The purpose of the present study is to evaluate the effectiveness of exercise during 2nd trimester of pregnancy on reduction of low back pain and kinematics of spine.

2. Materials and Methodology

Study Design: A pretest and posttest -experimental design comparative in nature.

Study Setting: The study was conducted in Dr. Sengaliappan Nursing Home, Saibabacolony, Coimbatore.

Study Duration: The study was conducted for a period of 6 months.

Treatment Duration: The treatment duration is with an exercise program given 3 times a week for 12 weeks during 2nd trimester of pregnancy.

Population and Sampling: 30 subjects were selected by convenient sampling method.

Inclusion Criteria:

- Pregnant women aged between 18-35 years.
- Gestational age 20 weeks- 32 weeks.

Exclusion Criteria:

- Heart disease
- Diabetes mellitus
- Thyrotoxicosis
- Hypertension
- Infection in uterus
- History of smoking and alcoholic intake.

Materials Used

- couch
- pillow
- stepper
- stool

Parameter for Analysis

- Oswestry low back pain disability questionnaire
- Trunk side bending test
- Pregnancy mobility index

3. Procedure

The subjects for the study are pregnant women of 18- 35 years of age who are in 2nd trimester of pregnancy. After explaining about the study procedure and informed consent

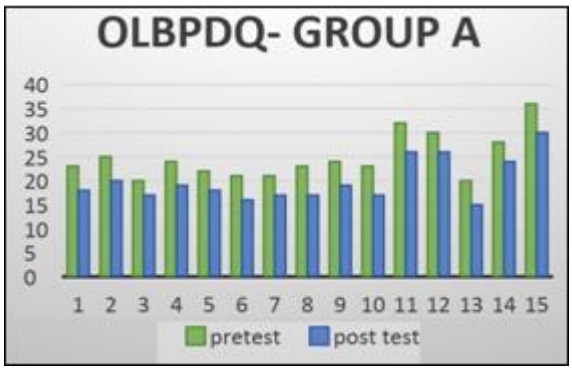
was obtained. Then the subjects were assigned to Group A (15) and Group B (15) by randomized allocation method. Pretest assessment of pain was done using the oswestry low back pain disability questionnaire, kinematics of spine using the trunk side bending test and mobility status of the pregnant women is assessed using pregnancy mobility index. For group A, the exercise program of abdominal strengthening, back muscle stretching, hip flexor stretching and hamstring strengthening exercise is given by therapist to the individual during 2nd trimester of pregnancy was given for 30 minutes, for about 3 times a week for about 12 weeks and after 3 months posttest assessment was taken. Pretest assessment of pain using the oswestry low back pain disability questionnaire, kinematics of spine using the trunk side bending test and mobility status of the pregnant women is assessed using pregnancy mobility index. For subject of group B, they are performing only standard antenatal exercise. After three months posttest assessment was taken.

4. Data Analysis and Interpretation

Data analysis is a method of evaluation in the research study. In this study evaluating the data is through the descriptive statistical method.

Comparison of Pretest and Post Test (Oswestry Low Back Pain Disability Questionnaire) Values of Group A

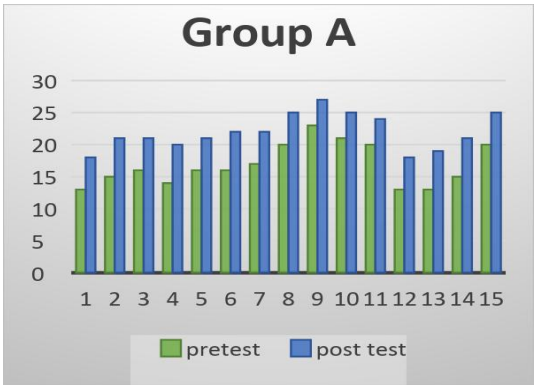
GP	Test	M	M. D	SD	CAL 't' Value	't' table value at 0.005
A	Pre Post	24.8 19.3	4.866	0.915	20.588	3.326



Since the calculated 't' value (20.588) is greater than 't' table value (3.326) and the P>0.00

Comparison of Pretest and Post Test (Trunk Side Bending Test) Values of Group A

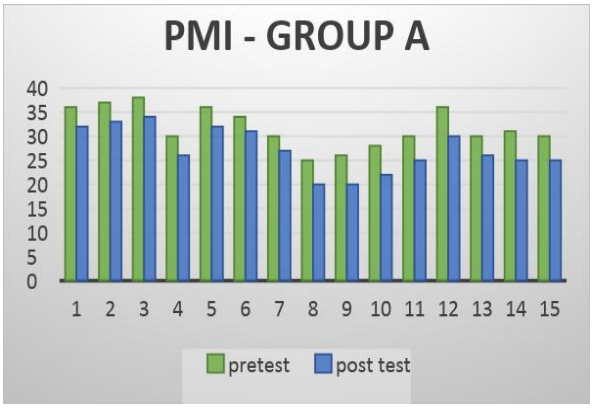
GP	Test	M	M.D	SD	Cal 't' value	't' table value at 0.005
A	Pre Post	16.8 21.93	5.13	0.74	26.73	3.32



Since the calculated 't' value (26.73177) is greater than 't' table value (3.326) and the P>0.005

Comparison of Pretest and Post Test (Pregnancy Mobility Index) Values of Group A

GP	Test	M	M .D	S D	CAL 't' value	't' table value at 0.005
A	Pre Post	31.8 27.2	4.6	1.055	16.86	3.326

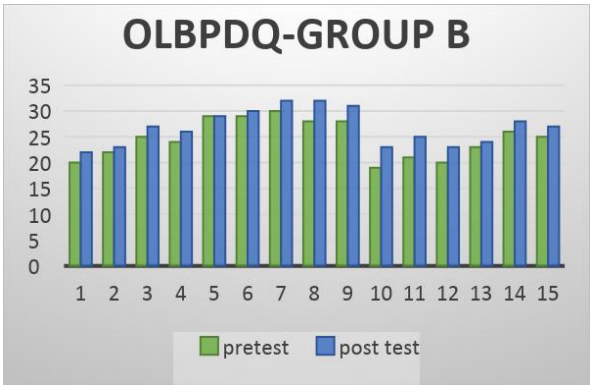


Since the calculated 't' value (16.8649) is greater than 't' table value (3.326) and the P>0.005

Comparison of Pretest and Post Test (Oswestry Low Back Pain Disability Questionnaire) Values of Group B

Table 4

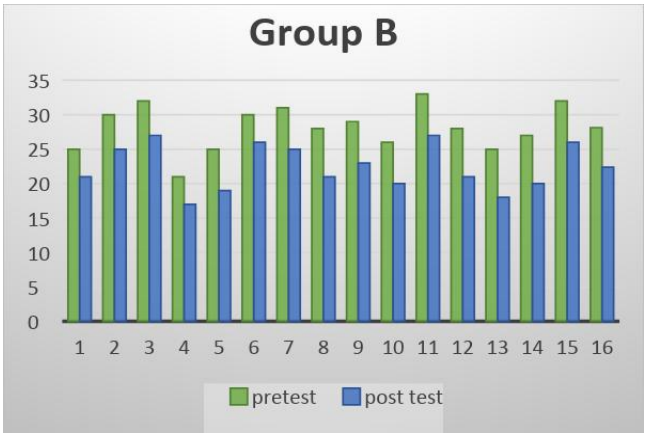
GP	Test	M	M.D	S.D	CAL 't' value	't' table value At 0.005
B	Pre Post	24.6 26.8	2.2	1.2071	7.0532	3.326



Since the calculated‘t’ value (7.0532) is greater than‘t’ table value (3.326) and the P>0.005.

Comparison Of Pretest And Post Test (Trunk Sidebending Test) Values Of Group B Table-5

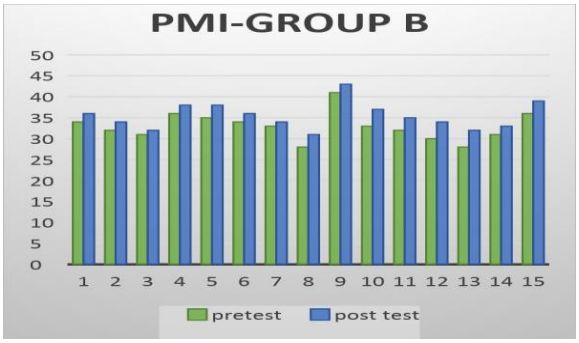
GP	Test	M	M.D	SD	CAL ‘t’value	Table ‘t’ table value At 0.005
B	Pre Post	28.13333 22.4	4.6	1.0997	20.176	3.326



Since the calculated‘t’ value (20.176) is greater than‘t’ table value (3.326) and the P>0.005.

Comparison of Pretest and Post Test (Pregnancy Mobility Index) Values of Group B Table

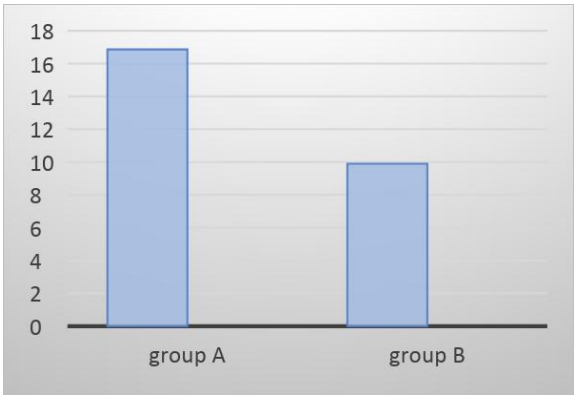
GP	Test	M	M D	SD	CAL ‘t’ Value	‘t’ table value at 0.005
B	Pre Post	32.93333 35.46667	2.53333	0.99042	9.8987	3.326



Since the calculated ‘t’ value (9.8987) is greater than ‘t’ table value (3.326) and the P>0.005.

Comparison of Pretest and Post Test (Oswestry Low Back Pain Disability Questionnaire) Values of Group A and B

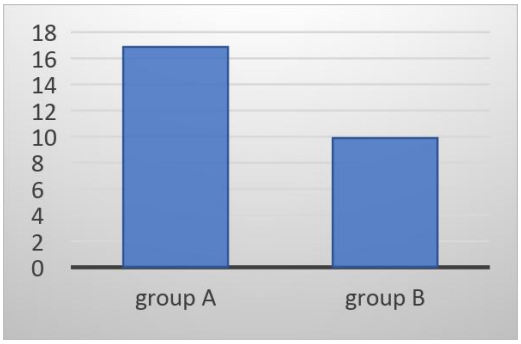
GP	S D	Unpaired ‘t’ TEST (calculated)	Table ‘t’ Value at 0.005
A B	1.07122	18.0686	3.047



Since the calculated ‘t’ value (18.0686) is greater than ‘t’ table value (3.047) and the P>0.005.

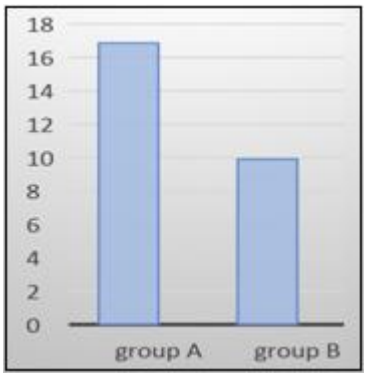
Comparison of Pretest and Post Test (Trunk Side Bending Test) Values of Group A and B

GP	SD	Unpaired ‘t’value (calculated)	Table ‘t’ value at 0.005
A B	0.93	31.711	3.047

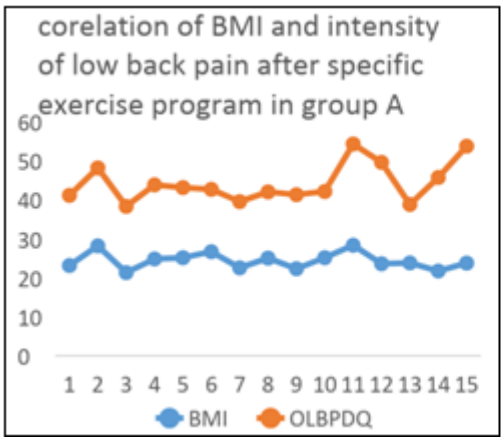


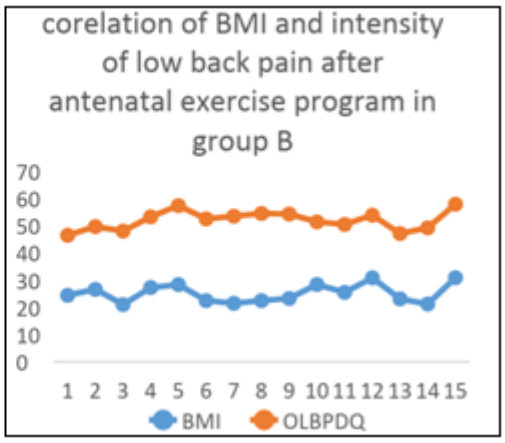
Since the calculated ‘t’ value (31.711) is greater than ‘t’ table value (3.047) and the P>0.005

Group	SD	Unpaired ‘t’ CAL Value	‘t’ table value 0.005
A B	1.0235	19.0899	3.047

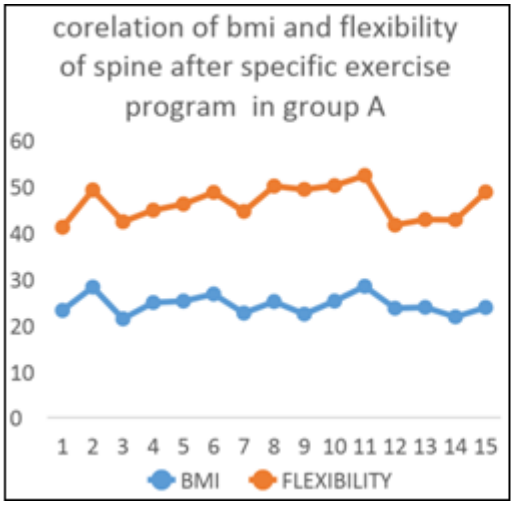


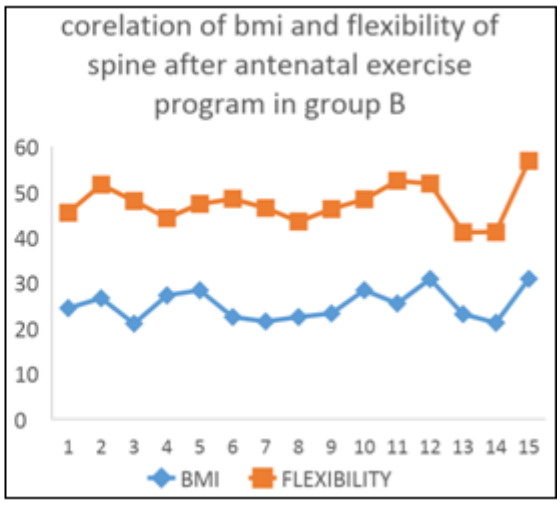
Since the calculated ‘t’ value (19.0899) is greater than ‘t’ table value (3.047) and the P>0.005.



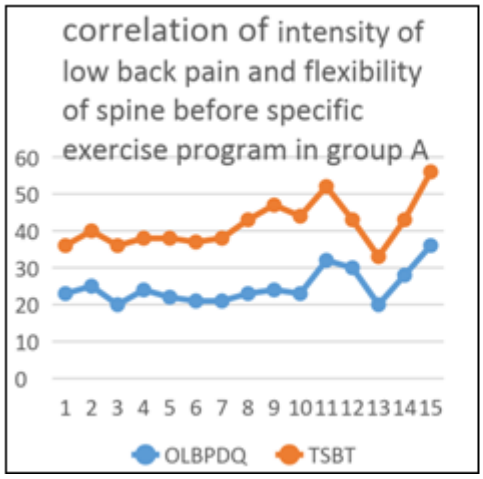


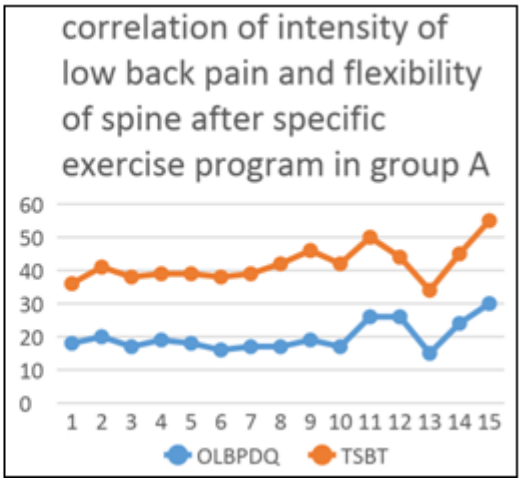
After specific exercise program in group A those who are having high BMI also they have significant reduction on the intensity of low back pain when compared to group B.



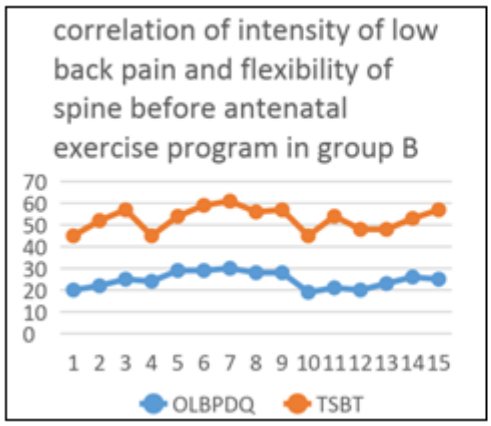


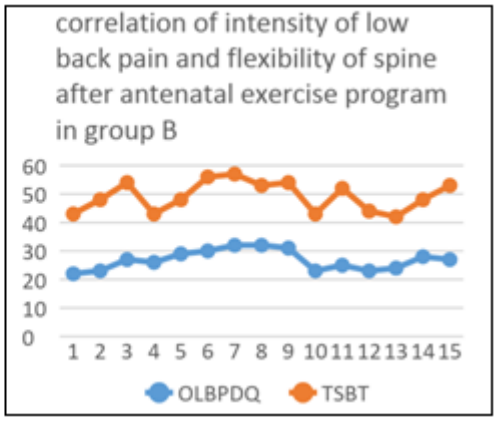
After specific exercise program in group A those who are having high BMI also they have significant changes in the flexibility of spine when compared to group B.





After specific exercise program in group A there is significant reduction in the intensity of low back pain and changes in the flexibility of spine.





After antenatal exercise program in group B there is significant reduction in the intensity of low back pain and changes in the flexibility of spine. And hereby we conclude that when the low back pain is reduced the flexibility of spine is increased.

5. Results

The results conclude that group A, who underwent abdominal strengthening exercise, hamstring strengthening exercise, hip flexor stretching exercise and paravertebral muscles stretching exercise are more effective in reducing the intensity of low back pain and changes in kinematics of spine than Group B who underwent antenatal exercise.

6. Discussion

A. Garshasbi and S. Faghih Zadeh concluded that after exercise, there is reduction of intensity of low back pain and significant changes in the kinematics of spine and no changes in the lordosis of pregnant women. **I skelmpe kokic et al** conclude that after the exercise programme individuals had beneficial effects on severity of lumbo pelvic pain in pregnancy, reducing in the intensity of pain, changes in kinematics of spine and the level of disability experienced as a result.**Helena Andrade Figueria and Rodrigo Gomes De Souza Vale** concluded that after following static flexibility exercise program. it has significant reduction in the low back pain. These result supports that after following exercise of abdominal strengthening exercise, back muscle stretching exercise, hamstring strengthening exercise and hip flexor stretching there is significant reduction in the intensity of low back pain and changes in the kinematics of spine.

Our study also suggested that exercise during 2nd trimester of pregnancy has significant reduction in the intensity of low back pain and significant changes in the kinematics of the spine that the pregnant individual who are not performing any exercise. The number of the subjects selected for the study was 30. The subjects were divided into two groups, group A and group B. Group A received exercise namely abdominal strengthening exercise, back stretching , hip flexor stretching and hamstring strengthening exercise. Group B as control group who receive only standard antenatal exercise. The subjects were treated 3 times a week for about 12 weeks. Before starting the treatment pretest was measured by oswestry low back disability questionnaire, trunk side bending test and pregnancy mobility index. After the treatment posttest was measured by oswestry low back disability questionnaire for pain, trunk side bending test for flexibility and pregnancy mobility index for mobility status of pregnant women.

The result showed that, the exercise group who performed abdominal strengthening, back muscle stretching, hip flexor stretching and hamstring strengthening exercise during 2nd trimester of pregnancy with reference to Group A (OLBPDQ) 't' calculated value (20.58880) is significantly greater than 3.326 (> 0.005). For (TSBT) 't' calculated value (26.73177) is significantly greater than 3.326 (> 0.005) . For (PMI) 't' calculated value (16.8649) is significantly greater than 3.326 (> 0.005).

The result showed that, the group who performs standard antenatal exercise during 2nd trimester of pregnancy with reference to Group B (OLBPDQ) 't' calculated value (7.0532) is significantly greater than 3.326 (> 0.005).For (TSBT) 't' calculated value (20.176) is significantly greater than 3.326 (> 0.005). For (PMI) 't' calculated value (9.8987) is significantly greater than 3.326 (> 0.005).

When comparing both group values by a paired (OLBPDQ) 't' test the calculated 't' value is (18.0686) and 't' table value is (3.047) >0.005. For (TSBT) 't' test the calculated value (31.711) and 't' table value (3.047) > 0.005. For (PMI) 't' test calculated value (19.0899) and 't' table value (3.047) >0.005. Hence unpaired't' test shows comparative effects of group A and group B.

There is a positive correlation between the BMI and intensity of low back pain after the specific exercise program. And there is negative correlation between the BMI and flexibility of spine after specific exercise program finally this will give the positive feedback about the reduction of low back pain and change in kinematics of spine in 2nd trimester of pregnancy. In this study we realized after the exercise program the flexibility is increased, this leads to changes in kinematics of spine thereby reduction in intensity of low back pain in 2nd trimester of pregnancy. This helped pregnant women to move comfortably in and around.

After specific exercise program in group A those who are having high BMI also they have significant reduction on the intensity of low back pain when compared to group B. After specific exercise program in group A those who are having high BMI also they have significant changes in flexibility of

spine when compared to group B. After specific exercise program in group A there is significant reduction in the intensity of low back pain and changes in the flexibility of spine. After antenatal exercise program in group B there is significant reduction in the intensity of low back pain and changes in the flexibility of spine.

And hereby we conclude that when the low back pain is reduced, the flexibility of spine is increased. Hence we conclude, the abdominal strengthening, back muscle stretching, hip flexor stretching and hamstring strengthening exercise is more effective than the pregnant women who underwent only antenatal exercise in reducing the intensity of low back pain, the changes in kinematics of spine and flexibility during the 2nd trimester of pregnancy.

7. Conclusion

From the data presentation and analysis it is evident that In the study we concluded that the pregnant women who underwent exercises namely abdominal strengthening exercise, hamstring strengthening exercise, hip flexor stretching exercise and paravertebral muscles stretching exercise are more effective than the pregnant women who underwent standard antenatal exercise in reducing the intensity of low back pain and changes in kinematics of spine during the 2nd trimester of pregnancy. And hereby we conclude that when the low back pain is reduced, the flexibility of spine is increased.

8. Limitations and Recommendations

- Duration of the study is only 3 months
- The sample size of the study is small.
- Only for pregnant women.
- Gestation period between 17-22 weeks.
- Similar studies can be done on increased sample size.
- Similar study can be done for longer duration
- Further studies can be conducted by using various measurement.

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