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Effect of Core Strengthening Exercises on Post- Partum Women with Lumbar Dysfunction

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Abstract

Background: Low back pain is the most common problem faced by women post -partum. Core muscles play important role in maintaining the balance pelvis and spine. It plays important role in trunk control. This study aimed to find our effect of core strengthening exercises along with conventional method in post-partum women with lumbar dysfunction.

Objectives: The objective was to assess the effect of core strengthening exercises along with conventional treatment protocol on post- partum women with lumbar dysfunction.

Materials and Method: In this comparative study, postpartum women with lumbar dysfunction who had lower segment caesarean sections or full-term natural deliveries undergone complete comparison. Samples were obtained by the use of random sampling. A total of 72 samples were gathered, which were then split into two groups with 36 participants each: control group A and experimental group B. Oswestry Disability Scale and Visual Analogue Scale were utilised as outcome measures. Pre-test, post-test, and post-four-week assessments were all part of a four-week study. For each of the outcome measures, an unpaired t test was utilised.

Results: A total of 72 samples were gathered, and 36 subjects from the control and experimental groups were placed in each group. When compared to conventional treatment alone, a significant and extremely significant difference was seen for the combination of core strengthening and conventional treatment protocol.

Conclusion: This study found that, in postpartum women with lumbar dysfunction, a combination of conventional treatment protocol and core strengthening exercises significantly and extremely significantly improved lumbar dysfunction compared to conventional protocol alone.

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1. Introduction:

Low back pain is the most growing problem around the world but it's very common post-delivery as post-delivery whole-body mechanism changes. Post- partum back pain in women happens because the abdominal muscles happen to become weak and the stability of lumbar spine is reduced[1.] It has been shown that lumbopelvic hip muscle dysfunction (muscle core) increases the load on spine and it affects the stability of the spine [2] .Due to chronic low back pain lumbar mobility decreases and it also affects the core muscles. Several ligaments connect the lumbar region to maintain stability and offer support. Also, low back pain is common health problem in primary healthcare center[3] Back pain is an inconvenience that can affects daily activities due to discomfort or pain.[4] post-delivery the belly expands due to which the abdominal muscles stretch and back muscles get shortened in lower back area lumbar spine and sacrum is included. Lumbar lordosis is increased during delivery and post-delivery it is reverted to its normal position this all is physiological change that occurs during pregnancy. Weakness of superficial trunk muscles is also important risk factor[5]

Post- delivery the belly expands due to which the abdominal muscles stretch and back muscles get shortened in lower back area lumbar spine and sacrum is included. Lumbar lordosis is increased during delivery and post-delivery it is reverted to its normal position this all is physiological change that occurs during pregnancy. Weakness of superficial trunk muscles is also important risk factor [5]. Low back discomfort, however, can also be brought on by other factors, such as weak legs and hamstrings, a weak trunk, and short back muscles. These skeletal characteristics may account for the altered spinal shape that predisposes to pregnancy. For different types low back pain symptoms may vary and according to that intervention also changes. Engaging both deep and superficial spinal muscles is necessary for core stability.[6,7]. According to some studies, the hormone relaxin's levels in the blood and pregnancy pelvic pain are related. [8] Epidural anaesthesia also leads to back pain[9]

Lumbar dysfunction is very common post-delivery it may be due to many reasons. Obesity can lead to physical inactivity which can later lead to lumbar pain. A defect in multifidus muscle also leads to acute low back pain[10] During full term normal delivery muscles get stretched and there is strain on muscles. Over use of muscle may also lead to pain. In Lower segment caesarean section pain may be due to stiches and because of which core muscles become weak Poor posture contributes to low back pain. wrong posture during breastfeeding, sitting without back support. Now lumbar pain may be due to bad posture, hormonal factor, muscle strain or sedentary lifestyle. There is another condition called diastasis recti which leads to weak abdominal muscles. Diastasis recti is stretching of Linea alba with abnormal widening of the gap between the two medial sides of rectus abdominus muscle.[11] [12] number of studies have shown that dysfunction in voluntary activation of the deep-lying trunk muscles have connection to chronic low back pain [13] Since abdominal musculature plays a important role in trunk control and function, compromise of the core muscles due to DRA (Diastasis recti abdominus) can decrease the mechanical control of the abdomen and affect its functions. These include posture, trunk stability, respiration, trunk flexion, rotation, side bending. Furthermore, DRA may be implicated in low back pain.[14] During pregnancy, the abdominal muscles are stretched due to expanding uterus.[15] Rectus abdominis muscle separation insertion has increased. Reversal in muscle separation was found by 4 weeks post birth. the ability it has to stabilize the pelvis against resistance was shown to be decreased as the period of pregnancy was

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progressed and if remained compromised post birth may lead to low back pain.[16]

Core muscles play important role during delivery also post- delivery. The abdominals, paraspinals, gluteals, diaphragm, pelvic floor, and hip girdle muscles make up the front and rear of the muscular box that makes up the core. Transverse abdominus, one of the inner core muscles in the core, stabilises the trunk and maintains abdominal pressure. If IAP falls, the lumbar spine becomes unstable, which causes loading on the lumbar spine. Also, it plays important role in thoracic and pelvic stability. It is attached to the thoracolumbar fascia If there is weakness of this, muscle it will lead to strain on fascia Internal oblique muscle helps in flexion of trunk. Diaphragm is primary muscle of breathing. Outer core muscles include Rectus abdominis is important muscle for trunk flexion, erector spinae help in extension of spine while flexion of vertebral column is done by action of quadratus lumborum. External oblique acts as prime mover of trunk. Main functions of core muscles are firstly to protect internal organs because the core muscles are tightly packed which leads to organ containment. Another important function is greater mobility. Exercises for the core teach your pelvis, lower back, hips, and abdomen to coordinate their movements. Better stability and balance result from this. Core muscles maintains the balance between spine and pelvis it helps spine to spare from excessive load because it travels load from lower body to upper body which keeps the whole-body stable. Core muscle control pelvic lumbar relationship as it controls the positions of your pelvis.

2. Materials and Methods:

Before the start of KIMSDU, Karad, an ethical clearance letter was requested from the institution's ethics committee. Following that, individuals with lumbar dysfunction were addressed. The study's objectives were described, and subjects who were willing to participate provided their written consent. The study's subjects were selected based on the selection criteria. The inclusion criteria were post-natal women, Age group 20-35 and Women with both FTND and LSCS type of delivery. The exclusion criteria Women with history of trauma to spine and women with congenital spinal deformity. Following inclusion, the process was described. Visual analogue scale and Oswestry disability scale measurements were taken prior to beginning workouts. For this study, a total of 72 women were participated, with both full-term vaginal deliveries and lower segment caesarean sections. These were further divided into two groups of 36 participants in each group. Both Group A and Group B used experimental techniques. Group A received Hot moist pack, active and passive correction of posture. Basic spinal exercises -flexion, extension, lateral flexion, stretching of spinal muscles. Group B was given same exercises along with core strengthening exercises Pelvic bridging cruntches, diaphragmatic breathing ,tummy tucks, pelvic tilting. Other exercises that were given were heel slides, leg extension, knee raises ang cat camel exercises. Assessment was taken before the test, then after two weeks and then after 4 weeks of treatment. Using outcome measurements, the impact of the treatment given to each group was promptly recognised.

3. Results:

Interpretation

At the baseline, before the therapy, two weeks after the treatment, and four weeks after the treatment, the outcome measure was evaluated. The unpaired t test was utilised for the statistical analysis.

Table no 1 shows age of women which is divided into three groups in 20-25,26-30,31-35. Mean and standard deviation of age group 20-25 in control group is (22.6±1.57) and in experimental group is (23.27±1.37), age group 26-30 in control group (28.62±1.33) and in

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experimental group is (27.5±1.27) and age group 31-35 in control group (32.67±2.08) and in experimental group is (32.5±1.73). Table no 1 also shows type of delivery in which FTND patients in control group were (63.89%) and in experimental group were (38.89%). LSCS patients in control group were (36.1%) and in experimental group were (61.1%).

Considering visual analogue scale as first outcome measure it was divided into VAS on rest and VAS on activity. So, Table no 2 shows mean, standard deviation and p value of visual analogue scale on rest. Mean and standard deviation of pre- test in control group was (5.83±1.13) and in control group was (4.89±1.37) with p value (<0.0001) which is considered extremely significant. VAS on rest after 2 weeks mean and standard deviation in control group was (3.11±0.75) and in experimental group was (1.33±0.78) with p value (<0.0001) which is considered extremely significant. VAS on rest after 4 weeks, mean and standard deviation in control group was (2.27±0.70) and in experimental group was (0.52±0.65) with p value (<0.0001) which is considered extremely significant.

Table no 3 shows mean standard deviation t value and p value of Visual analogue scale on activity. VAS on activity in pre-test, mean and standard deviation in control group was (5.83±1.13) and in experimental group was (4.89±1.37) with p value (0.0021) which is considered as significant. VAS on activity after 2 weeks, mean and standard deviation in control group was (4.83±1.03) and in experimental group was (3.64±0.93) with p value (<0.0001) which is considered extremely significant .VS on activity after 4 weeks, mean and standard deviation in control group was (3.40±0.73) and in experimental group was (2.53±0.77) with p value (<0.0001) which is extremely significant

Considering Oswestry disability scale as next outcome measure table no 4 shows the mean and standard deviation of pre- test in control group was (56.66±12.16) and in experimental group was (45.55±9.79) with p value (<0.0001)Then Oswestry disability scale after 2 weeks , mean and standard deviation in control group was (47.17±7.70) and in experimental group was (27.47±4.55) with p value (<0.0001) which is considered as extremely significant, Then scale after 4 week , mean and standard deviation in control group was (30.97±7.73) and in experimental group was (13.89±3.39) with p value (<0.0001) which is considered as extremely significant

Pie diagram above are shown, the first pie diagram is considering age distribution of control group (20-25:56%),(26-30: 36%),(31-35: 8%) the second pie diagram is age distribution of experimental group (20-25:61%),(26-30: 28%),(31-35: 11%).The third pie diagram is considering type of delivery of control group (FTND-64%), (LSCS-36%).The fourth pie diagram is Type o delivery of experimental group (FTND- 39%), (LSCS-61%).

Table no 1 -Demographic table for control group and experimental group in Post-natal women with lumbar dysfunction

Age (control group)	**frequency**	**percentage**	**Mean and standard deviation**
20-25	20	55.56%	22.6±1.57
26-30	13	36.1%	28.62±1.33
31-35	3	8.3%	32.67±2.08
Type of delivery			
FTND	23	63.89%	

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LSCS	13	36.1%	
Age (experimental group)			
20-25	22	61.1%	23.27±1.37
26-30	10	27.78%	27.5±1.27
31-35	4	11.1%	32.5±1.73
Type of delivery			
FTND	14	38.89%	
LSCS	22	61.1%	

Table no 2-Mean standard deviation, t value and p value for VAS on rest of control group and experimental group in Post-natal women with lumbar dysfunction

Outcome measures VAS on rest	**Control group**	**Experimental group**	**T value**	**P value**	**Interpretation**
	Mean± Standard deviation	Mean± Standard deviation			
Pre test	3.92±0.89	2.04±1.09	7.987	<0.0001	Extremely significant
2nd week	3.11±0.75	1.33±0.78	9.849	<0.0001	Extremely significant
4th week	2.27±0.70	0.52±0.65	10.948	<0.0001	Extremely significant

Table no 3- Mean, standard deviation, t value and p value for VAS on activity of control group and experimental in Post-natal women with lumbar dysfunction

Outcome measures VAS on activity	**Control group**	**Experimental group**	**T value**	**P value**	**Interpretation**
	Mean± Standard deviation	Mean± Standard deviation			
Pre test	5.83±1.13	4.89±1.37	3.188	0.0021	Significant
2nd week	4.83±1.03	3.64±0.93	5.168	<0.0001	Extremely significant
4th week	3.40±0.73	2.53±0.77	4.949	<0.0001	Extremely significant

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Table no 4-Mean, standard deviation, t value and p value for Oswestry disability scale in Post-natal women with lumbar dysfunction

Outcome measures Oswestry disability scale	**Control group**	**Experimental group**	**T value**	**P value**	**interpretation**
	Mean, Standard deviation	Mean, standard deviation			
Pre test	56.66±12.16	45.55±9.79	4.269	<0.0001	Extremely significant
2nd week	47.17±7.70	27.47±4.55	13.212	<0.0001	Extremely Significant
4th week	30.97±7.73	13.89±3.39	12.005	<0.0001	Extremely significant

4. Discussion:

This study was undertaken using core strengthening exercises with conventional exercises as a concept in post-partum women with lumbar dysfunction. During pregnancy a lot of mechanical changes during pregnancy there is shift in lordotic curve of spine because more weight is carried at front of body, the spine extends further to help you maintain the balance. Along with spinal curvature, balance and gait is also affected. With all of this the core muscles tend to become weak dure to expanding nature in period of pregnancy. Core muscles play important role in maintaining the balance between spine and pelvis during pregnancy. Post pregnancy as there is increase in lumbar lordosis (post-partum) back pain is very common in every woman. This may include whole spine or just a part of spine (cervical, thoracic, lumbar or sacral). Post-partum may also vary depending upon the type of delivery whether it is a full-term normal delivery or lower segment caesarean section. Post-partum back pain may be also due to bad postural habits while sitting or during breastfeeding. There are some contraindications to beginning an exercise program or resuming any started program they include physical injury, acute illness , serious chronic disease, persistent or recurrent abdominal or pelvic pain, and abnormal or heavy vaginal bleeding.[17] BMI also plays important role in primiparous and multiparous women[18] Having a stable core is necessary for the spine, pelvis, and kinetic chain to all be properly loaded. To maintain spinal stability and pelvic stability, the group of muscles that surround the spine as well as the abdominal, gluteal, hip girdle, and paraspinal muscles work together.[19] Relaxation of abdominal muscles is also important[20] During the excessive lordosis period there is strain on, muscles and ligaments around them. So improper posture habits like sitting without support, bending without bending at knee etc. Poor ergonomics also leads to long term low back pain. During pregnancy anterior pelvic tilt is increased and ligaments around them are softened for giving passage during delivery of baby. So, after delivery the tilt is reverted back as it is physiological process it is important to take care of pelvis post-delivery. This may lead to lumbar dysfunction. Women may unintentionally move their head and upper body posteriorly over their pelvis, causing hyperlordosis of the lumbar spine, as a result of the anterior displacement of the centre of gravity of the trunk and abdomen. It is

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thought that this change in load distribution causes stress on the ligaments, facet joints, and intervertebral discs, which encourages joint inflammation and synovial fluid production. Joint capsule inflammation results in discomfort and more sensitive joints. contend that women with a significant lumbar lordosis prepartum are more susceptible to low back pain during pregnancy rather than that low back pain may not be caused by hyper lordosis brought on by pregnancy. Women have bigger interfacets inside lumbar hyperlordosis, more interspinous space, and less vertebral wedging in the lower thoracic and higher vertebrae. The centre of gravity shifts anteriorly as the lordotic angle increases, increasing the shearing strain or stress in the anterior direction. Some people believe that this heightened angle and stress are connected to bad posture and back pain. The lumbar lordosis is linked to an increased prevalence of low back pain from a biomechanical perspective.

Lumbar dysfunction post pregnancy is common due to above reasons mentioned, there is also one more condition known as diastasis recti which is very in post-partum period. In these conditions the muscle tends to become loose and have poor tone after delivery. It compromises postural stability and contribute to lower back and pelvic pain. Lumbar lordosis which is excessive during pregnancy starts to revert back in its post-partum period. (DRAM) is common during and after pregnancy, and it's related to lumbopelvic instability and pelvic floor muscles weakness[21] The strength of core muscles can be checked by using manual muscle testing (curls ups)[22]. DRA is a midline as a result of an increase in intra-abdominal pressure[23].During full term normal delivery there is too much strain on back muscles, and abdominal muscles. The muscles and ligaments around spine are excessively stretched. Where as in lower segment caesarean section the stiches directly affect the abdominal muscles due to its stiches. This all contributes to chronic low back pain[24]. During pregnancy, due to overstretching of the abdominal muscles, the ability to perform a sit-up is significantly decreased which important to know that whether the core muscles are functioning properly[25] .But in case of immediate post-partum women it is difficult to perfume that test. During palpation, determined the number of finger widths filling the separation of abdominal muscle[26] According to some research, core strengthening exercises for all postpartum patients during the first six weeks after delivery should focus on getting the pelvic floor and transverse abdominis to contract simultaneously. There are studies where they have explained importance of core strengthening in post -partum period. There are studies which specifically focused on post-partum low back pain with postural correction while some studies just focused on diastasis recti. Some studies focused of improving lumbar lordosis post pregnancy. Some studies have proven that core strengthening plays important role post pregnancy.

In this study two groups were formed Control group and Experimental group. In control group 36 participants were present and they were given conventional mode of treatment which included hot moist pack, spinal exercises which included flexion, extension, lateral flexion of spine This also included stretching of spinal muscles (latissimus dorsi, rhomboid major and minor, multifidus, longissimus, spinalis, iliocostalis, quadratus lumborum, semispinalis capitis, psoas minor muscle), active and passive correction of posture of whole spine. This treatment was given to control group for post-partum lumbar dysfunction. The pain was assessed using visual analogue scale, then for assessing about other daily activities Oswestry disability scale was used. To check lumbar dysfunction modified Schober's test was used.

In group two that is experimental group along with conventional exercises core strengthening exercises were given. It started with

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diaphgrmatic breathing at first so the participant is relaxed which can relax the abdominal muscles. Then during pelvic bridging was given so that it increases flexibility, improves posture and balance because during pelvic bridging gluteus muscles – gluteus maximus, Medius and minimus along with hamstrings. Due to all this the core muscles are stabilized. The next exercise was straight leg raise, not complete raising just a little bit which puts pressure on abdominal muscles and help them to strengthen. Crunches were asked to perform; they strengthen lower back muscles as well as core muscles especially abdominal muscles to be more specific it works on obliques muscle A long with these tummy tucks were given. Along with this pelvic tilting was given. Other exercises that were given were heel slides, leg extension, knee raises ang cat camel exercises. In all of this exercises the lower back muscles and core muscles were put load on These women were assessed before starting the treatment then after 2weeks and then after 4 weeks. Home protocol was also given along with that. So, this study significantly showed that the experimental group showed better results than the control group. So core strengthening improves lumbar dysfunction in post-partum women.

5. Conclusion:

This study found that, in postpartum women with lumbar dysfunction, a combination of conventional treatment protocol and core strengthening exercises significantly and extremely significantly decreased lumbar dysfunction compared to conventional protocol alone.

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