

## Systematic Physiotherapy Intervention In non-specific low back pain:

### A case series.

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#### **ABSTRACT**

**Background and purpose:** Low back pain is one of the major disorders affecting the young and middle aged adults. This affects their productivity both functionally and professionally. The interventions available in the literature aim to reduce signs and symptoms that are specific in nature.

These treatment options appear to improve the condition up to a specific time period until the patient / individual return to his daily activities and job. Recurrence of signs and symptoms due to continual exposure to risk factors appear to cause chronicity of the condition and ultimately leads to early degenerative changes and pathologies.

A systematic physiotherapy intervention protocol which includes electrotherapy, manual therapy, exercise and ergonomic advice would be beneficial to this population by reducing pain and improving function.

**Case description:** Eight patients with low back pain completed a minimum of 3 weeks of intervention. Patient-reported outcomes of pain, function, and disability were assessed at baseline and the conclusion of treatment. The outcome measures were visual analogue scale(VAS), Patient Specific Functional Scale(PSFS), Modified Oswestry disability Questionnaire(MODQ), and Patient satisfaction scale(PSS). Lumbar range of motion was assessed using measuring tape and back and abdominal muscle strength was assessed according to MRC grading at baseline and post intervention.

**Outcomes:** After treatment all patients reported significant reduction in pain on activity and except for patients two and eight, no pain at rest. All patients had an improvement in PSFS score. The Modified oswestry disability questionnaire showed significant reduction in disability in all patients. All patients had improvement in lumbar flexion and extension. 6 patients showed improvement in lumbar side flexion to either sides. The manual muscle testing of the back and abdominal muscles showed that all patients had improvement in the muscle strength.

**Discussion:** The findings suggest that physical therapists can feasibly implement an intervention to improve outcomes in patients with low back pain.

**Key words:** Physiotherapy intervention, low back pain, Modified Oswestry Disability Questionnaire, Patient Specific functionalScale , Visual Analogue Scale.

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## **INTRODUCTION**

Low back pain (LBP) is a very common but largely self-limiting condition<sup>1</sup>. The lifetime prevalence of low back pain is reported to be as high as 84%, and the prevalence of chronic low back pain is about 23%, with 11-12% of the population being disabled by low back pain<sup>2</sup>. The incidence of LBP increases with age and is more prevalent in females<sup>3</sup>.

In order to meet the dynamic functional demands required of the spine, transition to the erect posture required the human spine to have a double S-shape<sup>2</sup>. The basic functional unit of the spine is the spinal motion segment, which may be defined as comprising the adjacent halves of two vertebrae, the interposed disc and articular facet joints, as well as the supporting structures (i.e ligament, blood vessels, nerves and vessels).

The stabilizing systems of the lumbar spine include an active mechanism. The thoracolumbar fascia and its powerful muscular attachments play an important role in stabilization of the thoracolumbar and pelvic region<sup>1</sup>. The quadratus lumborum is the most posterior and complex muscle, filling the space between the iliac crest and the twelfth rib, while also attaching to the transverse processes of the lumbar vertebrae. The core musculature consists of multifidus with its superficial and deep fibers, erector spinae acting as a postural muscle, longissimus thoracis acting in an extensor function during lifting. The abdominal muscles play an important role in providing dynamic stability to the spine (Cresswell et al. 1994, Cresswell and Thorstensson 1994, Crisco and Panjabi 1991). The transverse abdominis and internal oblique provide rotational and lateral movement to the spine. The dynamic stability is enhanced by co-activation of the multifidus along with deep abdominal muscles<sup>4</sup>. Non-specific low back pain is pain not attributable to a recognisable, known specific pathology (eg, infection, tumour, osteoporosis, fracture, structural deformity, inflammatory disorder, radicular syndrome, or cauda equine syndrome)<sup>5</sup>. The signs and symptoms of non-specific low back pain may include a limited range of motion, pain on activity and back tenderness which do not help in making a definitive diagnosis. Fear of movement and reinjury induce inactivity, and therefore, contribute to risk of chronic disability<sup>6</sup>.

Physical therapy interventions are widely used to treat low back pain. Conventional therapy includes electrotherapy pain relieving modalities like Interferential therapy, TENS, Short wave diathermy, Ultrasound and Hot Moistpack. Exercises like strengthening,

stretching, mobility exercises, yoga and spinal stabilization exercises are given appropriately. There is some evidence that immediate short term pain relief is achieved with lumbar spinal manipulation than with mobilization<sup>7</sup>.

**CASE REPORT:**

This case series includes outpatients referred to physiotherapy department between October 2016 and December 2016 for treatment of non-specific low back pain. The patients had to be between 18-45 years of age, both male and females, having non-specific low back pain for more than or equal to three months and referred by an orthopedician with the diagnosis of non-specific low back pain. Exclusion criteria for the case series included: (1) lumbosacral radiculopathy, (2) prolapsed intervertebral disc in the lumbosacral region, (3) lumbar spine spondylolisthesis, (4) fractures, (5) infection and (6) tumors. The patients' goals for physical therapy were to reduce pain and return to activities of daily living. This case series was approved by the institutional ethical committee. Eight patients provided informed consent prior to treatment. An intake assessment was completed that gathered data on demographic and health characteristics.

**PROCEDURES/ CLINICAL IMPRESSIONS:**

A baseline assessment was performed at the physical therapist evaluation. Participants were asked questions with regard to age, sex, employment and duration of symptoms. Informed consent was obtained from patients willing to be part of the study. The participants were administered Modified Oswestry Disability Questionnaire (MODQ), Visual Analogue Scale (VAS), and Patient Specific Functional Scale (PSFS). The questionnaires measured pain and functional status. All the information about the questionnaire was first explained in local language. Patient specific assessment for chronic low back pain was conducted, lumbar ROM also was assessed, and local examination was done, depending on which individualized intervention was provided. All patients received treatment for three-four weeks duration, five sessions per week. On completion of the treatment post interventional assessment and scores of VAS, MODQ, PSFS, were documented for analysis. An exit interview was used to determine patient satisfaction with treatment using Patient satisfaction scale (PSS), and adherence to a home exercise program.

**Table 1:**

<b>Patient no.</b>	<b>Age</b>	<b>Gender</b>	<b>Inpatient no.</b>	<b>Occupation</b>	<b>Duration of symptoms</b>	<b>Duration of treatment</b>
1	31	Female	1340673	Staff nurse	5 months	21 Days
2	39	Male	721943	Worker	1 Year	28 Days
3	32	Female	1056802	Receptionist	8 Months	25 Days
4	35	Female	751296	Receptionist	1 year	22 Days
5	23	Female	2924666	Student	1 Year 3 months	28 Days
6	28	Male	3595685	Worker	1 Year 6 Months	25 Days
7	21	Female	3858248	student	4 Months	24 Days
8	21	Female	3845464	student	1 Year	25 Days

### **EXAMINATION:**

The examination completed by a physical therapist consisted of an interview and physical examination. Patients' answered questions on past medical history, duration of symptoms, prior treatments received, social support and mental health. The MRI and X-RAYS were reviewed.

The physical examination assessed posture, lumbar ROM, core muscles strength which was based on the work of Daniels, Worthingham et.al<sup>8</sup>. A plumb line assessed forward head, rounded, forward, or elevated shoulders; thoracic kyphosis, lumbar lordosis and scoliosis ; pelvic tilt; alignment of the knees and ankles.

### **OUTCOME MEASURES:**

Pain: Pain intensity was assessed with a visual analogue scale (VAS).

Functional status: Functional status was measured with the Patient Specific Functional Scale (PSFS).

MODQ: The ODI is used to establish the level of disability, stage a patient's acuity status and monitor change over time<sup>9</sup>. The minimal clinically important difference for the Oswestry is eight to twelve percentage points<sup>10</sup>.

ROM: Goniometric measurements were used to assess lumbar ROM.

Patient satisfaction scale: The patient satisfaction scale is a valid and reliable scale to assess the satisfaction of the patient with the treatment.

Intervention: There were eight participants in the case series, each individual received treatment five times a week for three to four weeks with the study therapist.

The first session was evaluation and the patients were given ergonomic advice. In the remaining sessions of the first week the patients were treated to reduce the pain. During the second week the aim was to improve mobility and stability of the spine. The third week focused on strengthening of lower back and abdominal muscles along with improving the mobility and stability of the spine, a home exercise program was also given. The last week focussed on improving strength and co-ordination of the abdominal and back muscles.

Outcome: All the participants of the study completed a minimum of three to four weeks of intervention. There were no adverse events. During the second week one patient got strained at the end of the session and hence was not able to attend the remaining sessions of the week. Exit interviews showed that seven patients were satisfied with the program, and one patient was very satisfied. All patients had an improvement in PSFS score. The Modified Oswestry disability questionnaire showed significant reduction in disability in all patients. After

treatment all patients reported significant reduction in pain on activity and except for patients two and eight no pain at rest (table 2).

All patients showed improvement in lumbar ROM. Patients three and seven showed no improvement in lateral flexion to the right and patients four and five showed any improvement in lateral flexion to the left. All patients had improvement in lumbar flexion and extension.

The manual muscle testing of the back and abdominal muscles showed that all patients had improvement in the muscle strength

**RESULTS:**

**Table 2:**

<b>Patient No</b>	<b>1</b>		<b>2</b>		<b>5</b>		<b>6</b>	
<b>No of sessions</b>	<b>21</b>		<b>25</b>		<b>24</b>		<b>19</b>	
	<b>Baseline</b>	<b>Post treatment</b>	<b>Baseline</b>	<b>Post treatment</b>	<b>Baseline</b>	<b>Post treatment</b>	<b>Baseline</b>	<b>Post treatment</b>
Scales								
MODQ	42%	8%	26%	10%	32%	8%	23%	16%
PSFS	9	2	6	1.6	6.3	1.6	6	4
VAS	10/ 8.8	1.4/ 0	8.2/ 4.7	2.8/ 0.5	6.3/ 1.1	1.1/0	7.7/2.6	2/0
PSS		27		22		26		24
ROM (cm)								
Lumbar Flexion	6cm	8cm	5.5cm	7cm	6.5cm	8cm	5cm	7.8cm
Lumbar Extension	4 cm	5cm	3cm	4cm	5cm	5cm	3.2cm	4cm
Lateral Flexion Rt	10 cm	13 cm	6 cm	9 cm	10 cm	13 cm	7cm	9cm
Lateral Flexion Lt	11 cm	13.5 cm	6 cm	8 cm	12 cm	12 cm	10cm	12.4cm
MMT(MRC)								
Abdominals	3\5	4\5	3\5	3\5	3\5	4\5	3\5	4\5
Extensors	3\5	4\5	2\5	3\5	3\5	4\5	3\5	4\5
<b>Patient No</b>	<b>3</b>		<b>4</b>		<b>7</b>		<b>8</b>	
<b>No of sessions</b>	<b>20</b>		<b>19</b>		<b>20</b>		<b>18</b>	
	<b>Baseline</b>	<b>Post treatment</b>	<b>Baseline</b>	<b>Post treatment</b>	<b>Baseline</b>	<b>Post treatment</b>	<b>Baseline</b>	<b>Post treatment</b>
Scales								
MODQ	46%	18%	40%	15%	28%	7.50%	24%	4.40%
PSFS	6.3	1	6.6	1.6	7	2.5	5	2
VAS	8.4/ 3.7	3.7/ 0	8.9/ 2.4	3.4/ 0	7.9/3.2	2.4/0	8.7\3.8	3.6\0.8
PSS		25		24		23		25
ROM (cm)								
Lumbar Flexion	8cm	9cm	6cm	8cm	7cm	8cm	8cm	9cm
Lumbar Extension	4.5cm	5 cm	4cm	5cm	3cm	4cm	3.5cm	5cm

Lateral Flexion Rt	15 cm	15 cm	8 cm	10 cm	10cm	10cm	10.8cm	12cm
Lateral Flexion Lt	13 cm	15 cm	10 cm	10 cm	9cm	11cm	11cm	12.4cm
MMT(MRC)								
Abdominals	4\5	4\5	3\5	4\5	3\5	4\5	3\5	4\5
Extensors	3\5	4\5	3\5	4\5	3\5	4\5	3\5	4\5

**DISCUSSION**

A study was done to compare the effectiveness of Trunk muscle stabilization training plus general exercise versus general exercise only which indicated that combination of general exercise program along with muscle stabilization exercise technique was found to be more effective than general exercise only. Another comparative study showed that routine physiotherapy was more effective than one session of physiotherapy advice.

A randomized trial was done to compare Intensive, Dynamic Back-Muscle Exercises, Conventional Physiotherapy, or Placebo-Control Treatment of Low-Back Pain which indicated that intensive back exercises were effective in female patients and physiotherapy was effective in male patients. A study was done to find the effectiveness of early mobility verses complete rest in the treatment of chronic low back pain which indicated that early mobility is more effective.

The findings of this case series demonstrate that a systematic physical therapy intervention protocol which is specific to the patients’ symptoms is feasible for patients with non-specific low back pain. Furthermore findings suggest that the protocol improves patients outcome related to pain, functional status, muscle strength and ROM.

Pain was the primary complaint of all the patients not surprising based on the underlying cause mainly being their occupation. All patients had significant reduction in pain on activity and no pain at rest except for patients two and eight who had mild pain at rest after completion of the treatment.

Improvement in functional status appeared clinically meaningful in all patients, exceeding the published values of two points on PSFS at treatment completion<sup>11</sup>. This finding may have been due to the reduction in pain, attributed to the electrotherapeutic modalities used; Core stabilization exercises, Strengthening, endurance and co-ordination exercises along with yoga.

Hot moist pack was used for all patients along with the suitable electrotherapy modality which were decided based on the patients’ symptoms. Ultrasound was given in case the patients had point tenderness and sustained mechanical lumbar traction was given for patients who had paraspinalmuscle spasm and intermittent traction was given to improve mobility of the lumbar spine. once there was reduction in pain stabilization exercises which included strengthening of transverse abdominis and multifidus muscle, leg cycling in supine, bridging and progressive limb loading exercises were started and based on the improvement shown by

the patients the progression of the exercises was taught, also yoga which included pavanmuktasana, bhujangasana and majrasana was given. Then during the third week mobility exercises that included Mckenzie approach, maitland mobilization and exercises like cat camel, pelvic tilting exercises, lower limb stretches were given and strengthening exercises which included abdominal strengthening exercises and planks were started and progressed accordingly and during the last week endurance and co-ordination exercises which included single leg bridging progressed to bridging on the bobath ball, leg arm raise in quadripod position were started. A home exercise program was taught and the patient was given ergonomic advice.

**CONCLUSION**

This case series shows that combination of electro therapy and stabilization exercise are helpful in reducing pain and strengthening exercises improve strength and prevent further recurrence of low back pain.

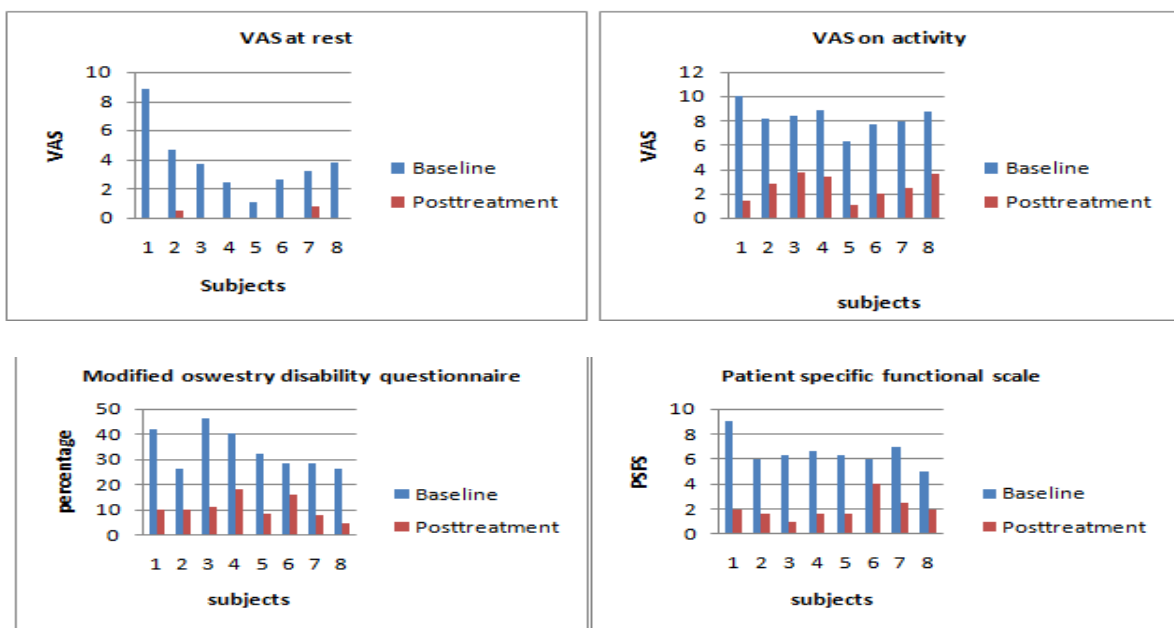
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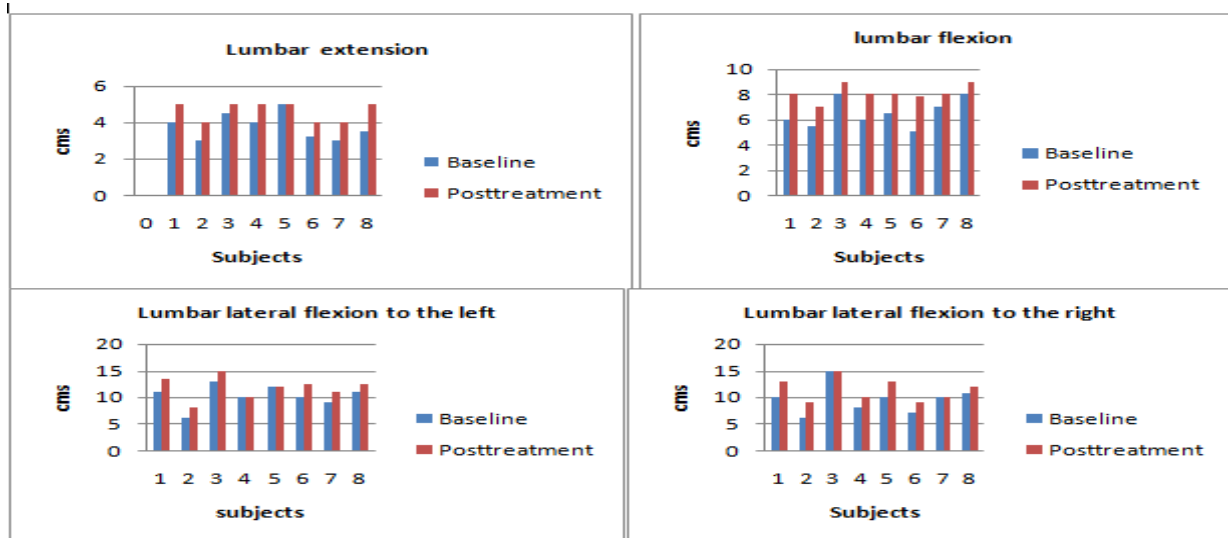
**FUTURE SCOPE OF THE STUDY:**

Cohort studies can be done to follow the subjects in the future and determine whether the effects are long term. Meta-analysis can also be done to find out the best treatment for non-specific low back pain.

**OUTCOME MEASURES:**



**RANGE OF MOTION:**



**LIMITATIONS:**

Several limitations should be considered when interpreting our findings. First, we used a case series design. A controlled group was not used, and statistical testing was not performed. Thus, the findings may be attributed to chance. Second, patient assessment occurred at the completion of the intervention, and longer follow up is needed to assess maintenance of treatment gain

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Week- 1 Sessions :-1-5	To reduce pain and educate the subject	<u>TENS</u> –high frequency 80-100 pulses/sec, amp-30, duration-15min/day <u>Hot Moist Pack</u> :-15min/ day on lower back <u>Myofascial release</u> <u>Trigger release</u> <u>Ergonomic advice</u>
Week- 2 Sessions :-6-10	Pain reduction Improve mobility of spine Improve stabilization of spine	<u>Mobility exercise</u> :- McKenzie approach, Pelvic tilting ex, Cat camel ex, Lower limb stretches, Yoga, Traction, Maitland mobilization. <u>Stabilization</u> :- Tummy tucks, Multifidus muscle strengthening, bridging, Leg cycling in supine.
Week:- 3 Sessions:-11-15	Improve mobility of the lumbar spine Improve stability of lumbar spine Strengthening of lower back and abdominal muscles Home program	<u>Mobility</u> :-Increase repetitions of cat camel ex and pelvic tilting ex, lower limb stretch, progression of Mckenzie ex. <u>Stability</u> :- limb loading ex, single leg bridging <u>Strengthening</u> :- extension of the back in prone lying, crunches
Week:-4 Sessions:-16-20	Improve strength and co-ordination of the abdominals and back muscles.	<u>Strengthening</u> :- progression of crunches, side planks, back extensor progression. <u>Co-ordination</u> :- single leg extension in quadripud position and progression with opposite arm and leg raise, bridging ex on gym ball. Home advice