Original Article

CORRELATION OF TRUNK EXTENSORS ENDURANCE WITH PAIN AND DISABILITY IN PATIENTS WITH NON RADIATING CHRONIC LOW BACK PAIN

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ABSTRACT

Objective: To find out the prevalence and magnitude of relationship between trunk extensors endurance, pain and disability in non radiating chronic low back pain (CLBP).
Study design: Cross sectional study and correlation design.
Methods: 40 patients (30 males and 10 females) with CLBP were selected from physiotherapy clinics who met the selection criteria. Trunk extensor muscles endurance, pain (TEE) and disability were measured using Sorensen test, visual analogue (VAS) and modified oswestry disability questionnaire (MODQ) respectively. Correlation between variables was measured using Pearson's correlation coefficient test using SPSS (21 version). Significance level was set at p d" 0.05.
Results: TEE has strong negative correlation with VAS (r -0.627) and very strong negative correlation with MODQ (r -0.778). There was strong positive correlation between VAS and MODQ (r 0.696). All values were significant at p d" 0.01.
Conclusion: Results of present study indicate that trunk extensors muscular endurance has negative influence over pain and disability in patients suffering from CLBP.
KEYWORDS: Trunk extensor endurance; Chronic low back pain; Disability.

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INTRODUCTION

The high frequency of low back pain (LBP) has been widely attested. It is estimated that 70% to 85% of all people encounter back pain at some time in their life (Anderson, 1999)[1] and it is defined as pain, paraesthesia and related symptoms that are believed to emanate from the lumbar spine.[2]

Low back pain is also very costly: Total incremental direct health care costs attributable to low back pain in the U.S. were estimated at $26.3 billion in 1998. In addition, indirect costs related to days lost from work are substantial, with approximately 2% of the U.S. work force compensated for back injuries each year.[3]

In India, occurrence of low back pain is also alarming; nearly 60 per cent of the people in India have significant back pain at some time or the other in lives (Suryapani, 1996).[4] The recurrence and duration of LBP symptoms are high and have been reported to be 78% at 1 year and 49% at 4 years follow up (Burton, McClune, Clarke, & Main, 2004).

Low back pain is one of the leading causes of disability (Holmstrom et al, 1992 & Jill A et al, 2005).[5,6] and has been reported the most common cause of activity limitation in people younger than 45 years (Anderson, 1999).

Activity limitations are defined in the World Health Organization's International Classification of Functioning, Disability and Health [ICIDH-2] as "difficulties an individual may have in executing activities."[7]

Some authorities suggest that muscle is a potential source of low back pain. They argue that failure of muscles to protect passive structures from excessive loading may result in damage to these pain-sensitive structures and produce pain. Poor endurance of the trunk muscles may induce strain on the passive structures of the lumbar spine, leading eventually to low back pain.[1]

Lack of endurance of trunk muscles has been identified as a predictor of first-time occurrence of low back trouble in men, and as a discriminating factor between those who have had a history of LBP and those who have not. The muscles of the trunk are active whether one is sitting, standing, lifting, or rolling over in bed. Adequate endurance of trunk muscles is necessary to good health but persons with CLBP do not demonstrate more trunk extensor activity during quiet standing than their non-impaired cohorts, possibly because they stand with a posteriorly displaced center of gravity, which results in less need for trunk extensor activity in maintaining upright posture.[7,8,9,10,11,12,13]

Researchers have intensively investigated trunk muscle function, which can be described in terms of strength, endurance, and speed[4]. But no research has been performed to study the existence of relationship and level of correlation between muscle endurance (impairment), pain and disability in people suffering from LBP. Therefore it is important to study all these three aspect of LBP i.e. physical impairment (TEE), pain & disability simultaneously.

This study will try to fill the gaps left by previous researches regarding the correlation between TEE, pain and disability in people suffering from low back pain. The objective of this study was to find out the existence of relationship as well as how far these three aspects of LBP can correlate using outcome measures i.e. Sorensen Test, MODQ and VAS.

MATERIALS AND METHODS

Present study was a cross sectional study with correlation design. The samples were selected from three leading orthopedic hospitals in Hisar. The inclusion criteria for the present study were chronic LBP characterized by back pain lasting more than 3 months in the past one year; age between 18 years and 50 years; and non radiating back pain without any neurological deficit confirmed through negative SLR, Slump and Lasegue's test. The exclusion criteria for the present study were malignant tumor, infection, or inflammatory disease affecting the spine; recent injury (acute); spinal or lower-limb surgery; spinal fractures; structural deformities such as spondylolisthesis and spondylolysis; pregnancy; any psychological or psychiatric disorder; any communication disorder; any systemic impairments such as cardiovascular disease, cerebrovascular disease, respiratory disorder and metabolic or GIT disorder.

Outcome variables used for the present study were Sorensen test to measure Trunk Extensors Endurance (TEE); Visual analogue scale (VAS) to measure pain; Modified Oswestry Disability Questionnaire (MODQ) to measure disability. The following instruments were used exercise couch, stop watch used for Sorensen test and tape measure secured to wall for measurement of height and weighing machine for measuring weight of subjects.

Procedure:

After fulfilling the selection criteria a total of 40 subjects (30 males and 10 females) with LBP were selected for the study. The mean (SD) age, height and weight were 28.93±8.17 yrs, 169.75±7.27 cm, and 67.75±12.25 kg respectively. Informed consent was taken from all subjects and the whole study protocol was approved by Departmental ethical committee. The patients were first asked to fill 10 cm VAS along with duration of back pain (chronicity), and MODQ, after that their trunk extensors endurance was measured using Sorensen's position.

Protocol:

VAS[14]

First the patients were asked for their pain; measured using the 10 cm Visual Analogue Scale

(VAS) consists of 10 points scale in it 0 indicates no pain and 10 indicates maximum pain.

MODQ[15]

The MODQ was used to measure disability of the patients it consists of 10 questions. Each question is scored from 0 to 5, with higher scores indicating greater disability. Then their percentages of disability were calculated by simply doubling the MODQ score.

Sorensen Test[16]

The patient lied on the examining table in the prone position with the upper edge of the iliac crests aligned with the edge of the table. The lower body was fixed to the table. The patient was asked to isometrically maintain the upper body in a horizontal position. The time during which the patient kept the upper body straight and horizontal was recorded through stopwatch. In patients who experience no difficulty in holding the position, the test was stopped after 240 sec.

It had been used as listed below:

Arm position:

The test was used with the arms bent, the elbows held out, and the hands on the ears or nape of the neck.

Location of the edge of the table:

The anterior–superior iliac spines were placed at the edge of the table.

Number of straps:

Two or three straps had been used to hold the lower body to the table.

Starting position:

The test was started with the upper body sloping downward toward the floor so that a concentric contraction of the trunk extensor muscles was needed initially to reach the horizontal position.

Lumbar Lordosis:

A pillow was placed under the lower abdomen to reduce lumbar lordosis (Overloading) in prone position[17].

Method for documenting the horizontal position of the upper body: Visual evaluation

Criteria for stopping the test: Specific test-stopping criteria were used, such as trunk down sloping by more than 5^0.

Statistics:

Data analysis was performed using software package SPSS 21 version for windows. Mean and S.D. of VAS, MODQ and TEE were calculated. Correlation between TEE with pain & disability was studied using Pearson's Correlation co-efficient. Significance level was set at $p \leq 0.05$.

RESULTS AND TABLES

S. No	Variable Name	Mean	SD	SEM	Minimum-maximum
1	VAS	4.85	1.73	0.27	2.0-8.0
2	MODQ (in %)	29.35	15.66	2.48	6.0-62
3	TEE (in sec)	50.68	23.21	3.67	5.0-90

SD: standard deviation; SEM: standard error of mean

Table 1: Descriptive statistics for pain, disability and trunk extensors endurance in CLBP (n=40)

	VAS	MODQ	TEE
VAS	1	0.696	-0.627
MODQ	0.696	1	-0.778
TEE	-0.627	-0.778	1

Table 2: Correlation between pain, disability and trunk extensors endurance in CLBP (n=40)

There was highly significant negative correlation between TEE and VAS (r = -0.627); TEE and MODQ (r = -0.778) at $P \leq 0.01$. Karen Friel et al, (2005) reported moderate correlation (r 0.482) between pain and endurance among LBP patients with lower limb amputation.

There was highly significant positive correlation between MODQ and VAS (r = 0.696) at $P \leq 0.01$. The result is similar to result reported by Karien Friel et al, (2005) (r 0.769).

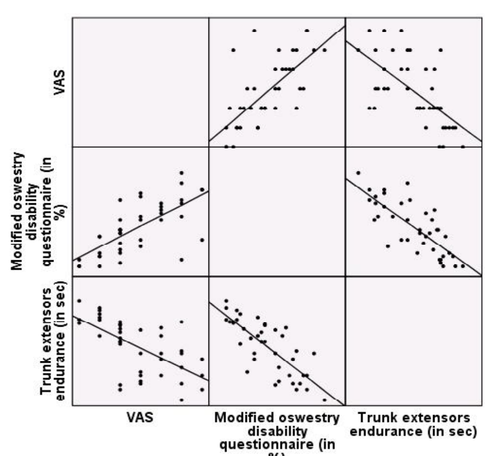

Figure 1: Correlation between pain, disability and trunk extensors endurance in CLBP patients (n=40)

There was highly significant positive correlation between VAS and MODQ (r = 0.696) but VAS and

TEE (r = -0.627) had highly negative correlation at P ≤ 0.01.

There was highly significant positive correlation between height and weight (r = 0.659); height and TEE (r = 0.432) at P ≤ 0.01.

There was highly significant positive correlation between age and MODQ (r = 0.369) however age and TEE (r = -0.569) had highly negative correlation at P ≤ 0.01.

Duration of pain had no significant correlation with any of other descriptive variables.

DISCUSSION

Present study indicates that endurance of trunk extensors has strong relationship with pain and disability in the people suffering from low back pain.

Results supporting the hypothesis that endurance of trunk extensors has negative correlation with pain as measured by VAS (Pearson r -0.627 at ≤ 0.01). As the endurance of trunk extensors decreases the pain increases.

This finding is in agreement with the findings of Holmstrom E[5], Mohammad Reza et al[11], Sýrt Kaslarýnýn et al[12], T. Nicolaisen and K Jorgensen[13], Moffroid et al[17], Hultman G[18], who suggested that muscle endurance is lower for people with low back pain than for individual without low back pain and muscle endurance and weakness are associated with LBP.

Present study data also supported the hypothesis that the endurance of trunk extensors has negative correlation with disability in people suffering from LBP as measured by MODQ (Pearson r -0.778 at ≤ 0.01). As the endurance of trunk extensors decreases the disability increases. This is in agreement with Rissanen et al[19] who reported that good trunk endurance performance may protect against back pain related disability in workers suggesting subliminally of negative relationship between the trunk extensors endurance and disability.

Beverly Chok et al[20] had also observed similar relationship when he reported that disability was reduced when trunk extensors endurance was increased through trunk extensors exercises in subacute low back pain. They also stated that disability was better correlated with pain measures than endurance performance in the subjects with subacute low back pain but present study indicate that disability can be better correlated with measures of both pain and trunk extensors endurance in subjects with CLBP.

In present study duration of pain has no significant correlation with endurance of trunk extensors, pain and disability.

In routine physical therapy muscle endurance is less frequently assessed than muscle strength or muscle length. The study of endurance of low back muscles is important to our understanding to manage low back pain successfully as the LBP management program usually consists of flexion and extension mobility exercises or passive mobilization/manipulation. Present study revealed strong relationship of trunk extensors endurance with LBP and disability in LBP and this will help people and therapists in designing a definitive LBP prevention program emphasizing improvement in all three dimensions of LBP i.e. TEE, Pain & Disability.

CONCLUSION

Results of present study indicate that trunk extensors muscular endurance has negative influence over pain and disability while pain & disability have positive correlation in patients suffering from CLBP. In simple words decrease in trunk extensors endurance can be correlated with increase in low back pain and disability or vice versa.

Conflicts of interest: None

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