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Physical Therapists' Evaluation of the Trunk Flexors in Patients with Low Back Pain

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ABSTRACT

Study Design: This study utilized a single blind design in the observation of 20 initial low back evaluations performed by physical therapists. The physical therapists were blinded to what the researchers were observing. **Objective:** The objective of this study was to determine whether or not physical therapists were quantifying the strength of trunk flexors when the patient's chief complaint was low back pain. **Background:** The literature has shown that there is a relationship between back pain and decreased strength in the abdominal muscles. Therefore, it appears important for physical therapists to evaluate the abdominal muscles in patients with low back pain. **Methods and Measures:** Twenty physical therapists participated in the study. The researchers observed if trunk flexor strength was quantified during the initial evaluation of 20 patients with low back pain. Following the observation, each physical therapist was given a questionnaire and asked to comment on their evaluation of the trunk flexors. **Results:** Of the evaluations that were observed, 15% of the physical therapists evaluated the trunk flexors and 85% did not. **Conclusion:** This study demonstrated that therapists did not consistently quantify abdominal strength when treating patients with low back pain.

INTRODUCTION

Studies indicate that 70-80% of the population experience at least one episode of back pain during their lifetime.^{1,2} Several factors have been associated with the incidence of low back pain. The literature has identified clinical factors to include changes in lumbar lordosis and pelvic tilt, leg length discrepancy, foot pronation, and the length, strength and endurance of various muscles of the trunk and lower extremity.³ One of the factors that has been highly associated with low back pain has been abdominal muscle weakness. Studies have investigated abdominal muscle weakness and its mechanical effect on the back. Some studies have speculated that weak abdominal muscles result in an increased anterior pelvic tilt and lumbar lordosis, while other studies have negated the relationship between pelvic tilt, lumbar lordosis and abdominal muscle weakness.⁴⁻⁷ But the fact remains that many studies have shown that patients with low back pain have weaker abdominal muscle strength than healthy controls.^{3, 8-15}

In 2002, Nourbakhsh and Arab³ performed a study with 600 men and women that showed that one of the factors associated with low back pain was decreased strength in the abdominal muscles. Other factors also associated with low back pain included muscle length and endurance of the back extensors, and strength of the hip flexors and hip adductors.³ Lee et al.¹⁴ investigated various factors associated with low back pain in an industrial setting. A cross sectional study was carried out among 1,562 employees of a large utilities corporation. The results indicated that abdominal muscle weakness was associated with chronic low back pain. Bayramoglu et al.¹⁵ found that in a sample of 25 female patients who had been experiencing low back pain for at

least 3 months, that decreased trunk muscle strength (extensors and abdominals) and increased body mass index was directly associated with chronic low back pain.

Helewa et al.⁸ compared four different measures of abdominal muscle strength in 24 male subjects (12 with low back pain and 12 without low back pain). The results showed that the subjects with low back pain had significantly weaker abdominal muscles in three of the four measures.⁸ In 1993, Helewa et al.¹⁶ continued their research on the relationship between abdominal muscle strength, lumbar stabilization, and low back pain. In this study, three instruments were used to test the strength of the abdominal muscles: a sphygmomanometer, a vigormeter, and a myometer. Each of these methods required the subject to perform a sit-up from supine. The test position was a half sit-up at 45 degrees of hip flexion, knees at 90 degrees, and feet secured. The results of the study showed that with all three instruments, the subjects who proclaimed to have low back pain, also had abdominal weakness and decreased lumbar stabilization when compared to the controls.¹⁶ This study verified the results Helewa et al.⁸ found in their 1990 study.

Suzuki et al.¹³ investigated the differences in trunk flexion strength, between 90 males with low back pain and 50 control subjects. The subjects performed the sit-up from supine while both isometric and isokinetic measurements were taken. Suzuki et al.¹³ discovered that the subjects with low back pain had significantly greater weakness in the abdominal muscles than the controls, when the abdominal muscles were tested with the legs extended. The researchers also calculated the percentage of strength decrements and found that there was a significant amount of fatigue in the subjects with low back pain as compared to the controls.¹³

In addition to the research indicating that abdominal muscle weakness is associated with low back pain, there is also considerable literature documenting the efficacy of low back exercises in the conservative treatment of chronic low back pain. In 1998, O'Sullivan et al.¹⁷ determined that conscious and automatic patterns of abdominal activity could be altered by specific exercise interventions. Helewa et al.¹⁸ compared back exercises and back education programs for patient with low back pain and found that the incidence of low back pain episodes were same when comparing the group receiving exercise and back education to the group receiving exercise only. In 2000, Taimela et al.¹⁹ showed that exercises are beneficial after guided treatment in the maintenance of the results of a physical therapy program for low back pain.

Takemasa et al.²⁰ performed a study with the purpose of examining the differences in trunk muscle strength characteristics and the effect of trunk muscle exercises on individuals with and without detectable organic lumbar lesions. The study included 123 subjects with chronic low back pain and 120 control subjects. The researchers evaluated trunk flexor and extensor muscle strength with an isokinetic/isometric strength-testing instrument. The subjects were seated in the device with their knees flexed at 90°, and their hips flexed at 72°. To determine strength, the subjects were tested in trunk flexion and extension, both isometrically and isokinetically. The subjects were first asked to build up tension until reaching their maximum isometric effort. At the maximum effort, the subjects were instructed to hold the contraction for a few seconds, and then repeated the trial after a 15 second rest.²⁰ In the isokinetic testing, the subjects moved from a range of 40° of trunk flexion, and 20° of trunk extension at a speed of 60° per second.

Torque and motion angles were measured during the isokinetic testing. Along with testing the strength, the researchers also evaluated the patients' clinical symptoms by using a visual analog scale (VAS) and the Japanese Orthopaedic Association scores.²⁰ These tools were used so that the researchers would have a way of evaluating the effect of strengthening on the patients' symptoms.

After a baseline measurement was taken, the patients with chronic low back pain were given a home-exercise program that included seven-second isometric contractions of the trunk flexors and extensors, that were to be performed ten times, twice daily. After approximately three months the patients' strength was re-evaluated. The correlation between improvements in low back pain and the increase in trunk muscle strength was analyzed.

The results showed that the maximum torque per unit of body weight was significantly lower for the trunk flexors of the subjects with chronic low back pain, than for the controls.²⁰ Another important finding was that after exercising for three months, the patients with chronic low back pain had more significant increases in the strength of their trunk flexors than the control group. Trunk strengthening exercises reduced low back pain in both groups, but were more effective in the group with back pain who had no detectable organic lesions. The degree of correlation between increased trunk flexor strength and improvement in low back pain was also higher in this group.²⁰ These findings agreed with the results of the previous studies^{8,10,11,12,13,16} that also found that patients with low back pain have weaker abdominal muscle strength than control subjects and increasing abdominal strength leads to decreased low back pain.

The literature supports the existence of a relationship between low back pain and trunk flexor weakness. Based on this information, it is important for physical therapists to assess abdominal muscle strength and its contribution to lumbar spine stabilization in patients with low back pain. The purpose of this study was to determine whether or not physical therapists are quantifying abdominal muscle strength during initial evaluations when the patient's chief complaint is low back pain.

METHODS

Design

This study utilized a single blind design in the observation of 20 initial low back evaluations. The physical therapists being observed were blinded to what the researchers were observing during the initial evaluation. This design was used so that the physical therapist did not change his or her evaluation techniques during the observation period. This study was approved by Nova Southeastern University Internal Review Board.

Subjects

Twenty physical therapists (and their patients) participated in the study. This was a sample of convenience and consisted of physical therapists practicing in outpatient sport medicine physical therapy clinics in South Florida. The clinics selected were those that routinely treated a large number of patients with low back pain. The physical therapists were selected to participate in the study if they had an evaluation scheduled with a patient who met the following inclusion criteria: (i) at least 18 years of age, (ii) reported low-back pain that had persisted for greater than one month. Each of the twenty therapists was observed during one evaluation.

The physical therapists signed an informed consent form. The explanation of the procedures stated that the researcher would observe the interaction between the physical therapist and patient during the initial evaluation. It did not explain that the researcher would be observing whether the physical therapist was evaluating trunk flexor strength during the evaluation. The consent form was worded in this way so that the therapists would not change their normal procedures for a low back evaluation. Consent to observe the evaluation was also obtained from the patients.

Procedures

Two physical therapy students collected the data. Prior to data collection, the students were trained by a physical therapist with expertise in evaluation and treatment of low back dysfunction on what assessments would qualify as quantified trunk flexor strength assessments. A data collection form was developed by the researchers (See Appendix A). A pilot study was performed where the two students observed five evaluations together. The results of the two student's observations were compared for consistency using the data collection form and found to be consistent.

During the actual data collection period, the two students simultaneously recorded whether or not the physical therapists quantified trunk flexor strength during the initial evaluation of twenty patients with a primary complaint of low back pain. Each therapist was observed evaluating one patient. If more than one physical therapist was observed at the same clinic, there was no communication among the participating physical therapists until after all physical therapists had completed the observation period. Following the observation, each physical therapist was given a questionnaire and asked to comment on their evaluation of the trunk flexors. The questionnaire also collected demographic information about the physical therapists (See Appendix B).

Results

Seven of the twenty (35%) physical therapists participating in the study were male and 13 of 20 (65%) were female. Twelve of the twenty (60%) therapists had a Bachelor's degree in physical therapy, and 8 of 20 (40%) had an entry level Master's degree in physical therapy. The physical therapists varied in the number of years that they had been practicing physical therapy (See Figure 1).

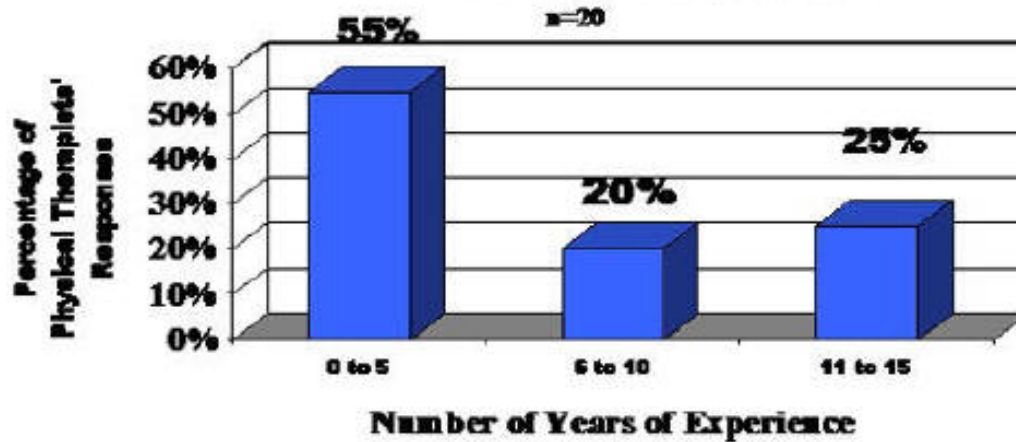


Figure 1: Physical Therapists' Years of Experience

Of the 20 initial evaluations that were observed, 3 of 20 (15%) included objective measures to quantify trunk flexor strength. Of the 17 out of 20 (85%) that did not, the two most common reasons given for why the trunk flexors were not assessed were: 1) the patient was in too much pain, and 2) abdominal strength or endurance was not a big focus of their initial evaluation. Other reasons included the following: there was not enough time during the evaluation, they saw the patient's strength as they moved, they forgot, or the patient said that they had weak abdominal muscles, so there was no need to test the strength or endurance (See Figure 2). Only 5% of the physical therapists stated they would quantify trunk flexor strength on the next visit.

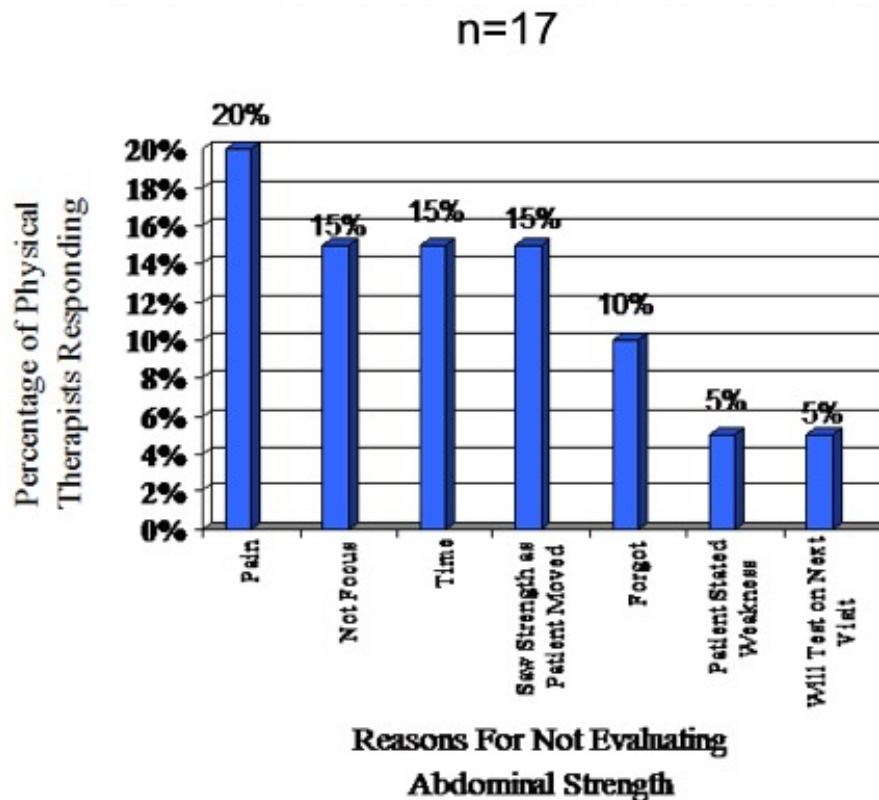


Figure 2: Reasons that physical therapists did not quantify trunk flexor strength

DISCUSSION

The majority (85%) of physical therapists observed did not quantify trunk flexor strength at the initial low back evaluation. Some physical therapists may feel that assessments of the trunk flexors are not good measures of a patient's functional capabilities. The fact that a patient has good trunk strength does not necessarily mean the patient can stabilize the lower trunk during a functional movement. Takemasa et al.,²⁰ Helewa et al.⁸ and Suzuki et al.,¹³ confirmed a link between trunk flexor muscle strength and low back pain. Each of these researchers found that patients with low back pain had weaker abdominal muscles than the control subjects without low back pain. The current study included patients who reported low back pain that had persisted for over a month, although the researchers did not quantify the level of pain of the subjects. Further study in this area should include an objective assessment of the subject's level of pain.

According to the APTA Guide to Physical Therapy Practice,²¹ there are 25 categories of tests and measures in Physical Therapy. The physical therapist selects those tests and measures most appropriate to the patient's signs, symptoms, and concerns using the clinical decision-making model. The goals, plan for treatment, and outcomes are based upon objective findings. Without proper documentation of the patient's initial status, the development of intervention plans may be compromised.²²

The literature suggests that physical therapists may be aware of the relationship between low back pain and trunk flexor weakness, as evident in their choices of treatments.^{15, 17, 19} Research by O'Sullivan et al.¹⁷ and Taimela et al.¹⁹ have demonstrated that conscious and automatic patterns of abdominal muscle activation can be altered by specific exercise interventions and that exercises are beneficial in the maintenance of the result following active treatment for recurrent low back pain. Bayramoglu et al.¹⁵ demonstrated that abdominal strengthening programs are helpful in reducing pain in patients with low back pain. Because the literature suggests this link between low back pain and abdominal muscle weakness, then it would be beneficial for physical therapists to quantify trunk flexor strength on the initial evaluation of patient who present with low back pain. Although this study used a small sample and a limited geographical area, it suggests that there is a need for further investigation to determine if physical therapists are using evidence based practices when selecting assessments and resultant interventions.

Studies by Nourbakhsh et al.,³ Ashmen et al.,⁶ Williams,²³ Mellin²⁴ and Jull et al.,²⁵ have also demonstrated a link between low back pain and the muscle strength and length in the back extensors, hip flexors, and hamstrings. Although these evaluation techniques were not the focus of the observation portion of this study, further research is needed to determine if physical therapists are aware of the link between low back pain and the length and strength of these various muscles and applying their knowledge in a relevant manner when determining the most appropriate evaluation techniques and interventions.

The limitations of this study are that a sample of convenience that was located only in South Florida was used. In addition, only 20 low back evaluations were observed. Although this study was a single blinded study, the physical therapists could have changed their usual evaluation procedures because they were being observed. It is also possible that the therapists visually assessed the ability of the patient to stabilize their trunk but did not quantify and document it.

Future research should include observation of a greater and more diverse population of physical therapists from initial evaluation to discharge. Determining if physical therapists are familiar with the different methods to quantify trunk strength would be beneficial. Additionally, investigation into the correlation between trunk weakness and the inability to stabilize the lumbar spine would provide valuable information. Further study needs to investigate whether physical therapists are generically prescribing trunk-strengthening exercises without objectively assessing the strength to determine the baseline level of the patient or if these exercises are needed.

CONCLUSION

The results of this study demonstrate that physical therapists may not be quantifying trunk flexor strength during initial low back evaluation sessions. Further study is needed in this area to determine if this practice is wide spread and why physical therapists may not be assessing the trunk stabilizers as part of the evaluation for patients with low back pain.

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Appendix A

DATA COLLECTION INSTRUMENT

1. Did the physical therapist quantify the strength of the abdominal muscles during the evaluation?

_____ yes

_____ no

2. If tested, what technique or instrument did the physical therapist use to quantify the strength of the abdominal muscles?

_____ Kendall's MMT technique

_____ Daniel's and Worthingham's MMT technique

_____ dynamometer

_____ isokinetic equipment

_____ other _____

Comments: _____

Appendix B

DEMOGRAPHIC SURVEY

Please answer the following questions. Place a check where necessary, and answer #6 and #7 in the spaces provided. Thank you!

1. Are you _____ male or _____ female?
2. Physical therapy degree:
_____ Bachelor's degree
_____ Master's degree
_____ Doctorate degree
_____ Certificate
3. How many years of physical therapy experience do you have?
_____ 0-5 years
_____ 6-10 years
_____ 11-15 years
_____ 16-20 years
_____ over 20 years
4. What is the highest degree that you have earned?
_____ Bachelor's
_____ Master's
_____ Doctorate
5. Did you quantify the abdominal muscle strength, during the low-back evaluation?
_____ yes
_____ no

(if Yes, go to # 6; if No, go to # 7)

6. How did you quantify the strength of the abdominal muscles (technique or instrument)?

7. Why did you choose not to quantify the strength of the abdominal muscles during the low-back evaluation? _____
