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A Basic Exercise Strategy for Low Back Pain - Mini Review

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Abstract

Low back pain (LBP) is a common condition, and most people experience at least one episode of LBP in their lifetime. Among them, 85% is non-specific LBP, and exercise is recommended to subside the pain for the condition. Joint by joint theory (JBJT) is one of the basic concept of conditioning training. Based on JBJT, lumbar spine is the stability joint, and the adjacent joints (thoracic spine and hip joints) are the mobility joint. For LBP patients, strategy in our institution is mobilization of the mobility joints and stabilization of the stability joint. Thereby, the mechanical stress of the lumbar spine would decrease and LBP would be healed. In this paper, we explain the strategy of the trunk exercise based on the JBJT.

Keywords: *Low Back Pain; Exercise; Joints; Mobility*

Introduction

Low back pain (LBP) is a common condition, and most people experience at least one episode of LBP in their lifetime. LBP may be non-specific or specific. In addition to pain, patients with specific LBP have red flag signs, which may include numbness, weakness, or pain in the legs and often require surgical treatment, such as decompression surgery for spinal canal stenosis. Deyo., *et al.* [1] found that specific LBP occurred in approximately 15% of all LBP patients, with the remaining 85% having non-specific LBP. Patients with non-specific LBP are unlikely to have red flag signs or leg symptoms and are usually treated conservatively. Exercise is one of the best conservative treatment options for these patients. Here, we describe our exercise-based treatment strategy for non-specific LBP.

Joint-by-joint theory

Figure 1 demonstrates the joint-by-joint theory [2]. In his textbook *Movement: Functional Movement Systems*, Cook divides all joints in the body into interconnected stability joints and mobility joints. According to this concept, the lumbar spine is the stability joints and the thoracic spine (thorax) and hip joints are the mobility joints. Based on the concept, core stabilization training is the optimum exercise for the lumbar spine, while stretching is preferred for mobilization of the hip joint and thoracic spine.

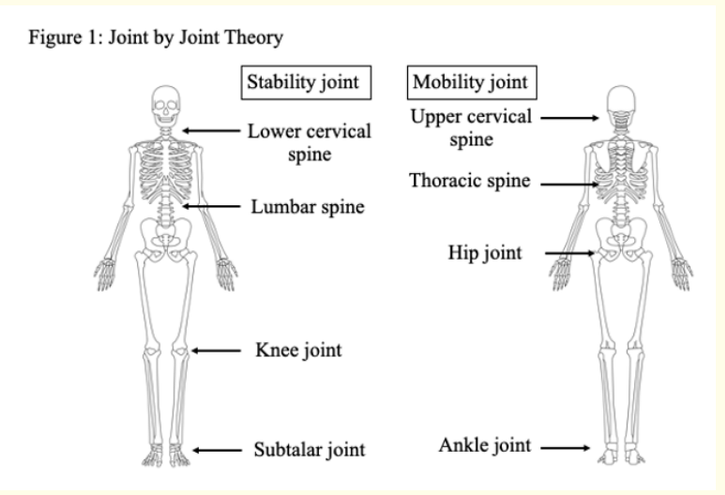

Figure 1: *Diagram illustrating the joint-by-joint theory. All joints in the body can be divided into interconnected stability joints and mobility joints.*

Stretching of mobility joints

Smooth movement of the hip joint involves two main muscle groups, namely, the quadriceps and hamstrings. The quadriceps run anterior to the hip joint and the hamstrings run posterior to it. Tightness of these muscle groups has been identified as a cause of LBP [3]. To mobilize these muscles when they are tight, we use an active type of stretching based on reciprocal inhibition; for example, the so-called "jack-knife" stretch for tight hamstrings [4]. Sato., *et al*. [5] applied the active stretching method for tight hamstrings and quadriceps in pediatric athletes and found it to be very effective.

For mobilization of the thoracic spine, we use a Pilates approach [6-8] examples of which are shown in figure 2-4. Figure 2 shows the "swan" exercise, which is based on the concept of articulation and elongation and improves mobility in extension by extending the thoracic spine segment by segment. The entire spine is elongated with deep inhalation in the prone position. Then, with slow exhalation, extension is achieved in the order of the head, cervical spine, and thoracic spine. Steps A to C are recommended for extension of the thoracic spine. Step D is the "full-swan", which may need to be avoided in patients with low back disorders. The next exercise is the "spine twist" (Figure 3), during which the thoracic spine rotates in the neutral position. In posture A, the spine is initially in neutral. Deep inhalation results in elongation of the entire spine and then, with slow exhalation, the thoracic spine rotates with rotation of the arm (postures B and C). The pelvis should be in a fixed position so that the thoracic spine can rotate effectively. The final exercise, known as the "mermaid", is shown in figure 4. This is a complex exercise that includes bending to the side with rotation and flexion. Posture A is the initial position. With deep inhalation, the entire length of the spine is elongated and then, with slow exhalation, the wide arc of the arm causes the thoracic spine to bend to the side (posture B). Again, with deep inhalation, the thoracic cage expands and then, with slow exhalation, the thoracic spine flexes and rotates segment by segment according to the basic concept of the articulation, as shown in posture C. The clinical outcome has been reported to be better using a Pilates-based approach than with traditional exercise methods [6-8].

Figure 2: Extension

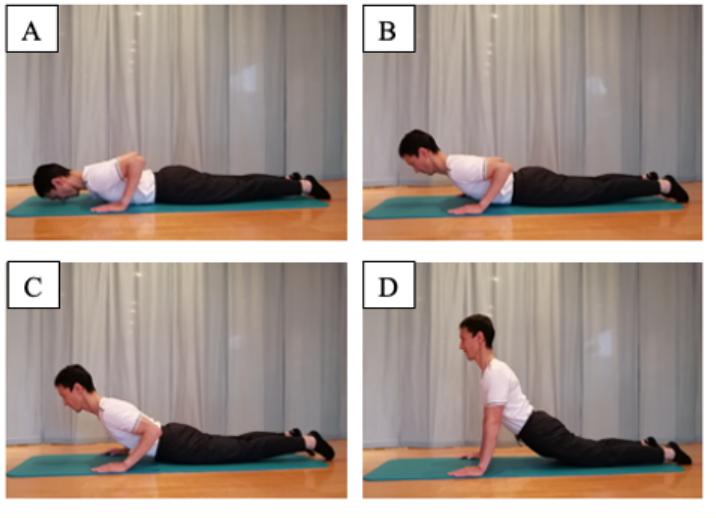

Figure 2: *The "swan" exercise for mobilizing the spine. Steps A to C are recommended for mobilization of the thoracic spine. Step D is the "full-swan" but should be avoided in patients with low back disorders.*

Figure 3: Rotation

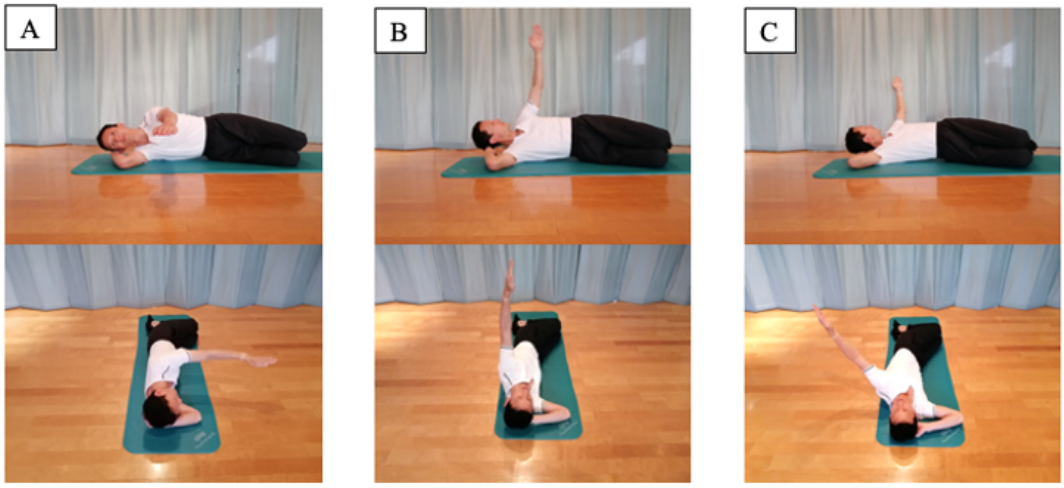

Figure 3: *The "spine twist" exercise. Posture A is the initial position with a neutral spine. Rotation of the arm produces rotation of the thoracic spine (postures B and C). The pelvis should be in a fixed position so that the thoracic spine can rotate effectively.*

Figure 4: Complex motion

Figure 4: *The "mermaid" exercise. Posture A is the initial position. The thoracic spine bends to the side with a wide arc of the arm (posture B). The thoracic spine flexes and rotates segment by segment according to the basic concept of the articulation, as shown in posture C.*

Strengthening exercise to stabilize joints in the lumbar spine

In our institution, we use a core muscle strengthening protocol to stabilize the lumbar spine [9-11]. The trunk includes both deep and superficial muscles, and core muscle strengthening exercise is effective for the deep muscles, which include the transversus abdominis and lumbar multifidus [9,12]. For this purpose, we recommend the "hand-knee" and "back bridge" exercises described by Okubo., *et al* [9]. Core muscle exercise is reported to be effective for reducing LBP [10,11].

Conclusion

At our institution, we apply the joint-by-joint theory as the basic treatment concept for LBP, especially non-specific LBP. The important elements of this approach are mobilization of the thoracic spine and the hip joints, followed by exercises to stabilize the lumbar spine.

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