CHAPTER 9
EXERCISE

Until almost the end of the 20th century, the conventional medical community recommended prolonged bed rest for back pain. It's only recently that physicians have begun recognizing that inactivity leads to weakness and deconditioning that can exacerbate pain problems.[1] Each day of bed rest can result in a loss of 1% to 3% of muscle strength. Muscles will also stiffen. The only cure is appropriate exercise.[2]

Muscles can also be the primary cause of pain. Common causes of muscle pain are muscle tension, weakness, stiffness, spasm, and trigger points.[3]

Muscle spasms, which come on quickly and can be excruciating, can result from unaccustomed exercise or other activities. They often go away themselves over time or can be broken up by using heat or ice and then gently stretching the involved muscle.[4]

Muscle weakness and stiffness occur when we don't get enough of the proper kind of exercise. This is also referred to as deconditioning. Exercise should begin with relaxation, to ease any tension in the muscle, and should then involve moving the muscle being exercised through its range of movement (limbering) followed by gentle stretching to overcome stiffness before attempting to strengthen the muscle. Healthy muscles not only are strong but also have a good range of motion, or flexibility. Exercising without stretching can create stiff muscles, which are more easily injured. It can be harder to overcome stiffness than weakness. Couch potatoes have both weakness and stiffness and are especially ripe for injury.[5] If we don't put our muscles through a full range of motion, they become stiff in the areas where they rarely or never move.[6]

Another way that muscles can contribute to pain is that when we are already in pain, we change the way we stand, sit, move, and lift to place less stress on the painful area. Over time, these unnatural changes to posture and movement may produce more soft tissue imbalances and pain.[7]

Many people in chronic pain avoid exercise because they are afraid of further injury and pain. Avoiding activity because of fear of pain is called kinesiophobia.[8]

The Kraus-Weber Exercises

In the early 1940s, Dr. Sonja Weber and Dr. Hans Kraus developed the Kraus-Weber test for minimum muscular strength and flexibility while working at Columbia Presbyterian Hospital in New York City. These tests require patients to perform simple exercises that test the strength of the upper and lower abdominal, psoas (hip flexor), and upper and lower back muscles as well as flexibility of the hamstrings. In a 1946 study Weber and Kraus conducted of 3,000 people with back pain, they found that only 18% had pathology that explained the pain. The other 82%, who had no identifiable pathology for their back pain, did fail at least one of the six Kraus-Weber tests.[9] These tests, along with the Kraus-Weber corrective exercises, are described in detail in Dr. Norman Marcus's book *End Back Pain Forever: A Groundbreaking Approach to Eliminating Your Suffering*.[10]

In 2001, a US review of published literature on 20,000 patients with low-back pain found that sprains and strains of muscles, tendons, and ligaments (collectively known as soft tissue) caused 70% to 80% of all low-back pain.[11] Many other pain conditions are related to soft tissue abnormalities. Recent studies have shown that the muscles in patients diagnosed with fibromyalgia can be the most significant cause of pain. Muscles can also be a significant source of pain in patients with rheumatoid arthritis and osteoarthritis.[12]

For decades now, conventional medicine has relied on X-rays, MRIs, and CT scans to diagnose pain problems. However, none of this high-tech imagery can detect soft tissue abnormalities, which might be the cause of pain.[13] The only way to determine whether soft tissue is a source of pain is by manual physical examination.[14]

John F. Kennedy

President John F. Kennedy suffered from severe back pain when he came to the White House. Before becoming president, he had already experienced two failed back surgeries, the first when he was 27 years old. Kennedy's back pain was so severe at one point that he sometimes used crutches. His Secret Service agents were worried that he would end up in a wheelchair. Dr. Hans Kraus, called in to treat him in October 1961, found that Kennedy's back muscles were weak and stiff, his abdominal muscles atrophied, and his leg muscles extremely tight. Within a month of doing the prescribed Kraus-Weber exercises, Kennedy's strength and flexibility had improved and his back pain had significantly decreased. He was able, for the first time, to pick up his then two-year-old son, John.[15]

From 1976 to 1988, more than 300,000 people around the world, including in the United States, participated in the "Y's Way to a Healthy Back," a six-week program offered at YMCAs that was based on the Kraus-Weber exercises.[16] I was one of them. The program was extremely valuable in helping me to recover from my deconditioned state, which resulted from three years of inactivity because of severe back pain and fear of reinjury. The most comprehensive study of the YMCA program included 11,809 participants and found that after six weeks of the program, 81% reported no pain or reduced pain. 83% of the 546 participants who had pain after back surgery reported less pain. Those participants who best adhered to the program and had the most measured improvement in strength and flexibility had the largest decreases in pain.[17] Unfortunately, the YMCA discontinued the program after Alexander Melleby, the physical educator who had brought the program into the YMCA, retired.[18]

The muscles in the abdomen, back, and pelvis, collectively known as core muscles, stabilize the pelvis and spine. When they are weak, low-back pain can occur. Pilates exercise is effective for correcting this problem, as are the Kraus-Weber exercises.[19]

More Research Results

A 2005 systematic review of exercise therapy for chronic low-back pain concluded that individually designed, supervised exercise programs that include stretching or strengthening may improve pain and function in chronic nonspecific low-back pain.[20]

Exercise has also been shown effective for chronic neck pain. A 2014 review of available research on physical therapy interventions concluded that active strengthening exercises increased strength,

improved function, reduced pain, and improved health-related quality of life. Adding stretching and aerobic exercise to treatment enhanced all of these benefits.[21] Exercise significantly reduced pain in both the short and intermediate term in a 2013 review of therapeutic exercise for chronic neck pain.[22] Twelve weeks of aerobic exercise of moderate intensity improved physical function and overall well-being of those with fibromyalgia, but it was less effective in reducing pain or tender points, according to a 2008 Cochrane review of published research. Strength training for 12 weeks resulted in large reductions in pain, tender points, and depression as well as large improvements in overall well-being but was less effective in improving physical function.[23] It seems reasonable to conclude that an exercise program that combines aerobic exercise and strength training would improve all aspects of fibromyalgia.

Dr. Winfried Hauser, a German MD and researcher who has published extensively on fibromyalgia, stated at a 2013 international scientific meeting in Paris, "Aerobic exercise is the most effective weapon we have" for patients with fibromyalgia.[24]

For rheumatoid arthritis, it has been found that aerobic exercise and strengthening programs are effective and safe, according to a 2006 review of studies. The exercise programs reduced bone mineral loss and reduced joint damage.[25]

A 2013 meta-analysis of exercise interventions for lower limb osteoarthritis (knee and hip) found that exercise interventions significantly improve pain and function. The most effective interventions were found to be those that combined strengthening exercises with exercises that improved flexibility and aerobic capacity, either on land or in water.[26]

Even though arthritis is a disease of the joints, strengthening the muscles helps because muscles act as "shock absorbers" in the body, lessening the impact of movement on arthritic joints. The exercises must be intense enough to significantly improve muscle strength to be effective.[27]

A 2014 study followed 1,788 adults with or at risk of knee osteoarthritis over a two-year period and found that those who walked more had better function. Walking more than 6,000 steps a day protected against developing functional limitations, and each additional 1,000 steps a day resulted in a 16% to 18% reduction in problems in function.[28]

Exercise doesn't have to be structured to aid in alleviating pain and improving function. A recent study of sedentary patients with chronic low-back pain compared a six-week aerobic treadmill walking program to a program of specific back muscle strengthening exercises. The study found that both types of exercise were equally effective in improving function in people with chronic low-back pain.[29]

Aquatic Exercise

Exercising in water can also be very beneficial in the alleviation of pain and may enable patients with significant mobility issues to exercise. Water immersion for physical rehabilitation and spiritual renewal has been practiced throughout the world since ancient times.[30] In modern times, during the polio epidemics of the 1900s, active movement was added to water therapy.[31] Water's property of buoyancy reduces pressure on joints, decreasing pain and making movement easier. The effective body weight in neck-deep water is only about 10% of the total on land; in chest deep immersion, it's 25%. This makes it easier for pain patients to engage in exercise and to strengthen joint-supporting muscles. Warm water immersion also relaxes muscles and may help the body eliminate pain-inducing toxins from soft tissue.[32]

Franklin D. Roosevelt

President Franklin D. Roosevelt was an avid proponent of water therapy. He suffered from partial paralysis as a result of contracting polio when he was 39 years old. A friend recommended to FDR that he visit a resort in Warm Springs, Georgia, to bathe in its warm mineral-rich waters. He was thrilled to discover the water was so buoyant that he could walk around in it without his braces. In 1927, he purchased the property and transformed it into a treatment center for polio patients. Thousands of polio victims have gone there for treatment over the years.[33]

A 12-week study of fibromyalgia patients and warm water immersion, with and without exercise, found that both groups obtained significant and similar relief from most fibromyalgia symptoms, but the group that exercised had longer term relief.[34]

A Japanese study of aquatic exercise for patients with low-back pain found that 90% of the patients reported improvement after six months. Exercises focused on strengthening the abdominal, gluteal, and leg muscles, stretching back, hip, hamstring, and calf muscles as well as walking in water and swimming. Patients participated from one to three times per week. Those who exercised more often showed a more significant physical improvement than those who exercised less.[35] Another study showed an increased return-to-work rate for people with low-back pain after an aquatic exercise program.[36]

Yoga

Yoga originated in India and is thousands of years old. It was introduced in the United States in 1893.[37] There are many types of yogic practices, some of which focus more on philosophy and others that focus more on physical and mental practice. In the United States the most popular type of yoga is hatha yoga, which includes physical exercises and postures, breathing techniques and meditation.[38] A well designed hatha yoga program increases body awareness, increases muscle strength and flexibility and promotes relaxation.[39]

A systematic review in 2011 of 10 randomized clinical trials of yoga in the treatment of chronic pain found that yoga leads to significantly greater pain reduction than standard care, self-care, therapeutic exercises, touch and manipulation, or no treatment.[40]

A 16-week study using iyengar yoga with patients with more than 10 years of chronic low-back pain found at three-month follow-up that patients had, on average, a 64% reduction in pain intensity, a 77% reduction in functional disability, and an 88% reduction in pain medication usage.[41]

A small, randomized controlled three-month study tested the effectiveness and safety of yoga therapy for adults aged 20 to 45 with nonspecific low-back pain or sciatica and disc extrusions or bulges. Patients participated in group classes and home practice of yoga that was modified to ensure safety for disc extrusions. Yoga was found to reduce pain and disability with no adverse effects.[42]

Yoga is no-impact and is meant to be done slowly with body awareness. Injuries can occur when yoga is taught in large classes with poor supervision.[43] Within hatha yoga are many different styles of yoga, some more gentle and some more strenuous than others. For someone in chronic pain, the safest route, if possible, is to start with one-on -one instruction with a yoga teacher trained in therapeutic yoga techniques. Some forms of yoga that have been specifically developed for therapeutic use include Integrative, Phoenix Rising, and Svaroopa yoga.[44]

Make sure, if you do take a yoga class, that your instructor is paying attention to your efforts and advising appropriate precautions for your condition. When I was in the early stages of my own back pain problem, I injured myself and made my back pain worse in an overcrowded yoga class with an inattentive teacher. She failed to emphasize to us that the safe practice of yoga involves paying attention to limitations and learning to gently expand our capacity.

---

[1] Marcus. (2012). *End Back Pain Forever*, 29.

[2] Marcus. (2012). *End Back Pain Forever*, 64.

[3] Marcus. (2012). *End Back Pain Forever*, 59.

[4] Marcus. (2012). *End Back Pain Forever*, 60-1.

[5] Marcus. (2012). *End Back Pain Forever*, 62-63.

[6] Marcus. (2012). *End Back Pain Forever*, 143.

[7] Marcus. (2012). *End Back Pain Forever*, 36.

[8] The Tampa Scale for Kinesiophobia assesses how much fear of injury is causing functional problems. https://www.tac.vic.gov.au/files-to-move/media/upload/tampa_scale_kinesiophobia.pdf. Higher scores mean that fear is interfering with recovery.

[9] http://www.bonnieprudden.com/blogs/where-are-my-muscle-weaknesses-%E2%80%93-and-what-do-i-do-about-them accessed on 10/14/14.

[10] Marcus. (2012). *End Back Pain Forever*, 36.

[11] Deyo, R.A. (2001). Weinstein J. Low-back pain. *New England Journal of Medicine, 344*(5), 363-370.

[12]Marcus. (2012). *End Back Pain Forever*, 56.

[13]Marcus. (2012). *End Back Pain Forever*, 4.

[14] Marcus. (2012). *End Back Pain Forever*, 35.

[15] Marcus. (2012). *End Back Pain Forever*, 94.

[16] Marcus. (2012). *End Back Pain Forever*, 95.

[17] Kraus, H., Nagler., & Melleby, A. (1983). Evaluation of an exercise program for back pain. *American Family Physician, 28*(3), 153-8.

[18] Marcus. (2012). *End Back Pain Forever*, 95.

[19] Marcus. (2012). *End Back Pain Forever*, 84.

[20] Hayden, J.A., van Tulder, M. W., & Tomlinson, G. Systematic review: strategies for using exercise therapy to improve outcomes in chronic low-back pain.

[21] O'Riordan, C, Cifford, A., Van De Ben, P., & Nelson, J. (2014). Chronic neck pain and exercise interventions: frequency, intensity, time and type principle. *Archives of Physical Medicine and Rehabilitation, 95*(4), 770-83.

[22] Bertozzi, L., Gardenghi, I., Turoni, F., Villafane, J. H., Capra, F., Guccione, A. A., & PIllastrini, P. (2013). Effect of therapeutic exercise on pain and disability in the management of chronic nonspecific neck pain: systematic review and meta-analysis of randomized trials. *Physical Therapy, 93*(8), 1026-36.

[23] Busch, A. J., Barber, K. A. R., Overend, T. J., Peloso, P. M. J., & Schachter, C. L. (2007). Exercise for treating fibromyalgia syndrome. Cochrane Database of Systematic Reviews. (4), Art. No.: CD003786.-See more at: http://summaries.cochrane.org/CD003786/MUSKEL_exercise-for-fibromyalgia#sthash.bwIlSsp2.dpuf

[24]Goodman, A. (2014). Aerobic Exercise "most effective weapon" for fibromyalgia. http://www.medscape.com/viewarticle/827054.

[25] Kennedy, N. (2006). Exercise therapy for patients with rheumatoid arthritis: safety of intensive programmes and effects upon bone mineral density and disease activity: a literature review. *Physical Therapy Reviews, 11*, 263-268.

[26] Uthman, O., van der Windt, D., Jordan, J., Dziedzic, K., Healey, E., Peat, G., & Foster, N. (2013). Exercise for lower limb osteoarthritis: systematic review incorporating trial sequential analysis and network meta-analysis. *British Medical Journal*, 347, f5555.

[27] *Tufts University Health & Nutrition Newsletter*. August 2003 Supplement.

[28] White, D. K., Tudor-Locke, C., Ahnag, Y., Fielding, R., LaValley, M., Felson DT . . . Neogi, T. (2014). Daily walking and the risk of incident functional limitation in knee osteoarthritis: an observational study. *Arthritis Care Research, 66*(9), 1328-36.

[29] Shnayderman, I. & Katz-Leurer, M. (2013). An aerobic walking programme versus muscle strengthening programme for chronic low-back pain: a randomized controlled trial. *Clinical Rehabilitation,* (3), 207-14.

[30] De Vierville, J. (1997). A history of aquatic rehabilitation. In: *Comprehensive Aquatic Rehabilitation, First Edition*, Becker B. E., C. A. (ed). Newton, MA: Butterworth-Heineman.

[31] De Vierville, J. (2004). Aquatic rehabilitation: a historical perspective, In: *Comprehensive Aquatic Rehabilitation*, 2nd edition. Cole, A. J., B.B. (ed.). Philadelphia, PA: Betterworth Heineman, 1-18.

[32] Kinnaird, D. W. & Becker, B. (2008). *Contemporary Aquatic Therapy and Pain Management in Integrative Pain Management*. Audette, J. & Bailey A. (eds.). Humana Press, 285-306.

[33] Franklin D. Roosevelt Presidential Library and Museum. Roosevelt Facts and Figures. http://www.fdrlibrary.marist.edu/facts/.

[34] Altan, L., Bingol, U., Aykac, M., Loc, Z., & Yurtkuran, M. (2004). Investigation of the effects of pool-based exercise on fibromyalgia syndrome. *Rheumatology International, 24*(5), 272-77.

[35] Ariyoshi, M, Sonoda, K., Nagata, K., Mashima, T., Zenmyo, M., Paku, C. . . . Mutoh Y. (1999). Efficacy of aquatic exercises for patients with low-back pain. *The Karume Medical Journal, 46*(2), 91-96.

[36] LeFort, S. M. & Hannah, T. E. (1994). Return to work following an aquafitness and muscle strengthening program for the low back injured. *Archives of Physical Medicine and Rehabilitation, 75*(11), 1247-1255.

[37] Fishman, L. & Satonstall, E. (2008). *Yoga in Pain Management in Integrative Pain Management*, Audette, J. & Bailey, A. (eds.) Humana Press, 259-260.

[38] Mamtani. R. & Frishman, W. (2008). *Ayurveda and Yoga in Complementary and Alternative Medicine in Pain Management*, Weintraub, M., Mamtani, R., & Micozzi, M. (eds.) Springer Publishing Company, 259.

[39] Fishman. (2008). *Yoga in Pain Management*, 62.

[40] Posadzki, P., Emst, E., Tery, R., & Lee, M. S. (2011). Is yoga effective for pain? A systematic review of randomized clinical trials. *Complementary Therapies in Medicine*, *19*(5), 281-7.

[41] Williams, K. A., Petronis, J., Smith, D., Goodrich, D., Wu, J., Ravi, N., Doyle, E. J., Jr., Gregory Juckett, R., Minoz Kolar, M., Gross, R., & Steinberg, L. (2005). Effect of Iyengar yoga therapy for chronic low-back pain. *Pain*, *115*(1-2), 107-117.

[42] Monro, R., Bhardwaj, A. K., Gupta, R. K., Telles, S., Allen, B., & Little, P. (2014). Disc extrusions and bulges in nonspecific low-back pain and sciatica: Exploratory randomised controlled trial comparing yoga therapy and normal medical treatment. *Journal of Back and Musculoskeletal Rehabilitation*, 2014 September 29 (Epub ahead of print) http://www.ncbi.nlm.nih.gov/pubmed/25271201

[43] Mamtani & Fisherman. (2008). *Ayurveda and Yoga*, 279.

[44] Mamatani & Fisherman. (2008). *Ayurveda and Yoga*. 263-4.