Exercise for Low Back Pain

What it Can and Cannot Do For Your Patients

James Rainville. MD
New England Baptist Hospital
Harvard Medical School

Exercise

- Safety
  - Risk for back injury in the general population
  - Risk for people with back problems
- Efficacy
  - Improving impaired back function
  - Improving back pain
  - Reducing disability

Risks of Exercise

- Precipitate back pain
- Accelerate or cause spinal degeneration
- Non back related risks
  - Musculoskeletal injuries

Prevalence of Back Pain Related to Fitness

- Harreby et al (1997) conducted a 25 year study of 640 school children
  - Those that were physically active for at least 3 hours per week had a lower lifetime risk of back pain

Prevalence of Back Pain Related to Fitness

- Suni et al (1998) evaluated 498 adults
  - High levels of fitness related to positive back health
  - Low levels of fitness associated with back dysfunction and pain

Prevalence of Back Pain Related to Fitness

- Croft et al (1999) followed 2715 adults without LBP
  - Greater leisure time physical activity did not increase one year risk of LBP
  - Poor physical health increased the risk of LBP

Prevalence of Back Pain Related to Fitness

- Viderman et al (1995) studied former elite athletes compared to age matched controls
  - LBP less common in former athletes
  - Frequency of sciatica equally common

Prevalence of Back Pain Related to Fitness

- Miranda et al (2002) compares 2000 adults without to 327 with sciatica
  - There was no statistical relationship between most exercise and sports activities and the occurrence of sciatica

Prevalence of Back Pain Related to Fitness

- Conclusion
  - There is no evidence that exercise and most sports participation increases the risk of LBP and sciatica or accelerate spinal degeneration
  - Exercise may have a slight protective effect for LBP but not for sciatica

Risks of Exercise for People with Back Pain

Risk of Exercise for People with Acute Back Pain

- Hides et al (2001) randomized subjects with acute LBP into exercise and control group
  - Exercise group had less recurrences of LBP over the next year

Risk of Exercise for People with Acute Back Pain

- Moffett et al (1999) randomized subjects with acute LBP into exercise or control group
  - Exercise group had significantly less sick leave over the next year

Risk of Exercise for People with Acute Back Pain

- Soukup et al (1999) randomixed subjects into exercise and control groups
  - Exercise group had a significant reduction of recurrent LBP
  - No difference in sick leave

Risk of Exercise for People with Recurrent or Chronic Back Pain

- Lindstrom et al (1992) randomized subject with subacute LBP into exercise or control group
  - Exercise group had significant less sick leave over the next year

Risk of Exercise for People with Recurrent or Chronic Back Pain

- Dochin et al (1990) randomized subjects with recurrent LBP (3 annual episodes) into exercise, back school or control group
  - The exercise group reported significantly fewer painful months over the next year

Risk of Exercise for People with Recurrent or Chronic Back Pain

- Taimela et al (2000) follower 125 subjects with chronic or recurrent LBP for 1 year after active rehab program
  - Those who performed best during rehab were most likely to maintain exercising
  - Those who maintained exercise had significantly less recurrent or persistent pain
  - Less work absence in exercise compliant group

Risk of Exercise for People with Recurrent or Chronic Back Pain

- Dettori et al (1995) randomized subjects into flexion exercise, extension exercise or control group
  - No differences in recurrence rates were found

Risk of Exercise for People with Recurrent or Chronic Back Pain

- Faas et al (1993) randomized subject into exercise and control group
  - No differences in sickness absence was noted

Risk of Exercise for People with Recurrent or Chronic Back Pain

- Bendix et al (2000) compared outcomes from a 39 hr/wk rehab program verses outpatient physical training program
  - No difference in work absence over the next year

Risk of Exercise for People with Recurrent or Chronic Back Pain

- Bentsen et al (1997) randomized women into intense exercise program in fitness center or home training program
  - No differences in work absence over the next 3 years
  - Exercise adherence much higher in the intense exercise group

Risk of Exercise for People with Back Pain

- There is no evidence that exercise increases the risk of additional back pain or work absence
- Exercise has either a neutral or slightly beneficial effect on risk

Risk of Exercise for People with Back Pain

- My Recommendations
  - People with back pain should exercise, run, ski, play sports as they desire

Therapeutic Goals of Exercise for People with Back Pain

- Exercise can improve or maintain physiological function
  - Musculoskeletal
  - Cardiovascular fitness

Musculoskeletal Impairments Associated with LBP

- Flexibility
  - (Mayer 1987, Waddell 1993, Rainville 1992)
- Back strength
  - (Holmes 1996, Risch 1993, Rissanen 1995, Mayer 1985)

Musculoskeletal Impairments Associated with LBP

- Etiology
  - Result from inhibition of movements and physical inactivity because of pain
    - Neurological changes in movement and recruitment patterns (Indahl 2003)
    - Loss of type-2 muscle fibers (Rissanen 1995)
    - Shortening of muscle and connective tissues

Musculoskeletal Impairments Associated with LBP

- Limitation of movements and inactivity are voluntary
  - Conscious and unconscious (pain and fear)
  - Often begin early in the course of LBP
  - May be reinforced by health care providers "avoid activities that cause pain"

Exercise as Treatment of Impairments in Flexibility

- Measure what you want to treat

Exercise as Treatment of Impairments in Flexibility

- Flexion 100-120 degrees
- Extension 25-45 degrees
- Side flexion 25-45 degrees
- SLR 75-85 degrees
  - (Mayer 1985. Waddell 1993, Rainville 1994)

Exercise as Treatment of Impairments in Flexibility

- Stretching
  - Should be performed at physiological end range
  - This often induces some back discomfort
  - Induction of pain does not indicate harm

Exercise as Treatment of Impairments in Flexibility

- Ballistic stretching
- Proprioceptive neuromuscular facilitation
- Static stretching
  - Hold position for 30 seconds
  - Can be repeated up to 4 sets for additional benefits
  - Three times per week for change
  - One time per week for maintenance

Exercise as Treatment of Impairments in Flexibility

- Average improvement of 20 percent in ROM
  - (Lindstoom 1992, Mayer 1985, Sacks 1990, Rainville 1992, Hazard 1989, Estlander 1991)

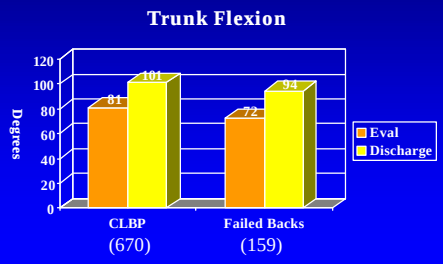
Spine Rehabilitation Database 2000 & 2001

Back or Leg Pain Intensity > 6
Symptom Duration > 6 Months
836 Patients

159
Failed Backs

670
Chronic Low Back Pain

Exercise as Treatment of Impairments in Flexibility



Exercise as Treatment of Impairments in Strength

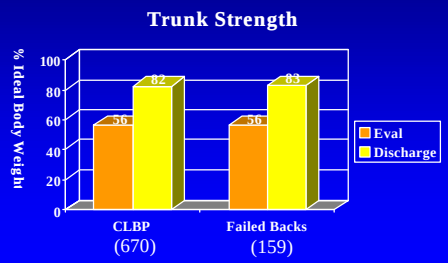
Exercise as Treatment of Impairments in Strength

- Isoinertial resistive training
  - Load, frequency, volume and mode of training
  - Performance can be quantified

Exercise as Treatment of Impairments in Strength

- Set of 8-12 at repetition maximum
- Frequency 1 - 3 times per week
- Improvements of 30 - 80% of volitional strength noted
  - (Risch 1993, Rissanen 1995, Mayer 1987, Holmes 1996, Mellin, 1993, Hazard 1989, Estlander 1991, Elnaggar 1991, Rainville 2002)

Exercise as Treatment of Impairments in Strength



Exercise as Treatment of Impairments in Strength

- Body weight as resistance
  - Floor exercises
  - Exercise ball
  - Roman Chair

Exercise as Treatment of Impairments in Strength

- Body weight as resistance
  - Advantages
    - Limited equipment
    - Can be done at home
  - Disadvantage
    - Not easily quantifiable
    - Research
    - Feedback

Exercise as Treatment of Impairments in Endurance

- Some individual reduced cardiovascular performance
  - Influenced by pain during testing (Wittink 2001)
- Training of 15 minutes 3 times per week at 75 % max HR

Exercise as Treatment of Impairments in Endurance

- Cardiovascular performance can be improved in patients with CLBP
  - (Rainville 1992, Van der Velde 2000, Hazard 1989, Wittink 2002, Robert 1995)

Exercise as a Modality to Reduce Chronic Low Back Pain

Exercise as a Modality to Reduce Chronic Low Back Pain

- 9 Observational Studies
- Range of pain reduction observed
  - 10% to 60 %
  - (Van der Velde 2000, Wittink 2001, Taimela 2000, Leggett 1999, Rainville 1992, Hazard 1989, Mayer 1987, Holmes 1996, Edwards 1992)

Exercise as a Modality to Reduce Chronic Low Back Pain - RCT

- Frost et al (1995) compared supervised active exercise with unsupervised home exercise program
- Pain reduction 38% Vs 12%

Exercise as a Modality to Reduce Chronic Low Back Pain - RCT

- Torstensen et al (1998) compared 1) active graded exercise program, 2) physical therapy and 3) an unsupervised walking program
- Pain reduction 30% Vs 23% Vs 9%

Exercise as a Modality to Reduce Chronic Low Back Pain - RCT

- Alaranta et al (1994) compared 3 week intensive exercise program with low level exercise combined with passive physical therapy
- Pain reduction 36% Vs 20%

Exercise as a Modality to Reduce Chronic Low Back Pain - RCT

- Manniche et al (1991) compared various intensities of back exercises
- Greater the intensity of exercise, the greater the reduction in pain

Exercise as a Modality to Reduce Chronic Low Back Pain - RCT

- Kankaanpää et al (1999) compared active rehabilitation to passive treatment
- Pain reduction 54% Vs 0%

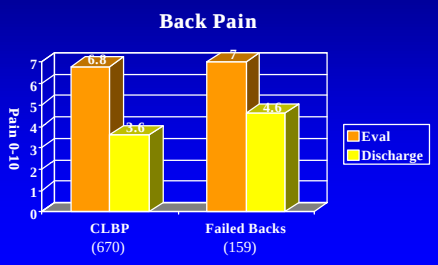
Exercise as a Modality to Reduce Chronic Low Back Pain - RCT

- Bendix et al (2000) compared extensive exercise to community treatment
- No change in pain in either group

Exercise as a Modality to Reduce Chronic Low Back Pain - RCT

- Hansen et al (1993) compared low intensity (floor) exercise to conventional PT
- No change in pain in either group

Exercise as a Modality to Reduce Chronic Low Back Pain



Exercise as a Modality to Reduce Chronic Low Back Pain

- Some evidence that aggressive exercise reduces back pain

Exercise as a Modality to Reduce Chronic Low Back Pain

- What are the mechanisms by which pain is reduced through exercise?

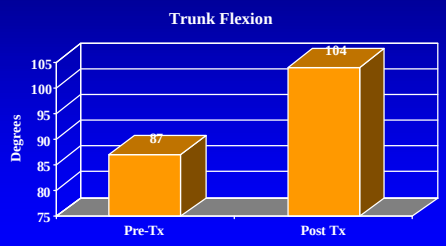
Exercise as a Modality to Reduce Chronic Low Back Pain

- Desensitization
  - Neurological
  - Physiological
  - Psychological

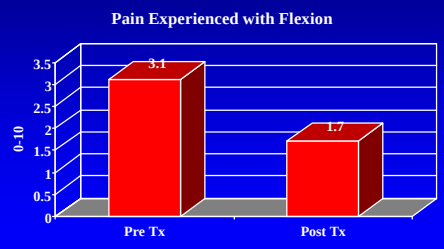
Exercise as a Modality to Reduce Chronic Low Back Pain

- 84 subjects with CLBP
- Tested physical performance levels pre- and post-treatment
- Measured pain experience during testing
  - Rainville et al (2003)

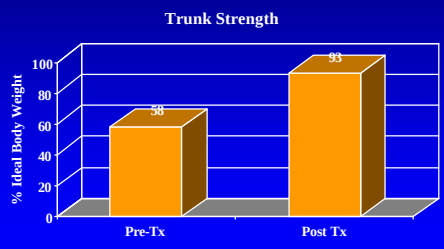
Exercise as a Modality to Reduce Chronic Low Back Pain



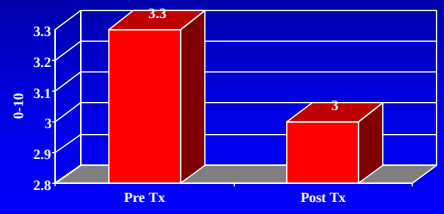
Exercise as a Modality to Reduce Chronic Low Back Pain



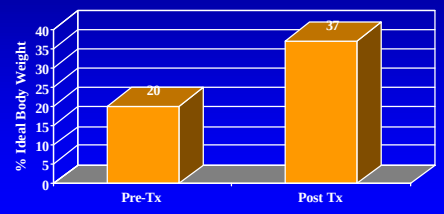
Exercise as a Modality to Reduce Chronic Low Back Pain



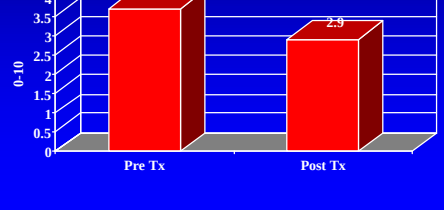
Exercise as a Modality to Reduce Chronic Low Back Pain



Exercise as a Modality to Reduce Chronic Low Back Pain



Exercise as a Modality to Reduce Chronic Low Back Pain

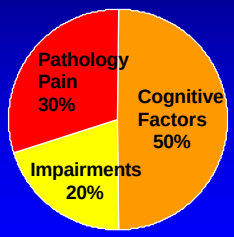


Exercise as a Modality to Reduce Disability

Exercise as a Modality to Reduce Disability

- Low back pain related disability results from a complex interaction of many factors

Relationship between Back Pain and Disability



Rainville,1994

Factors Influencing Back Pain Related Disability

- Psychological issues / illness
  - (Polatin 1993, Kinney 1993, Banks 1996, Gatchel 1995, Pincus 2002, Hoogendoorn 2000)
- Secondary gain $$$$
  - (Edwards 1992, Rainville 1997, Talo 1989, Krusen 1958, Hadler 1995, Greenough 1989)

Factors Influencing Back Pain Related Disability

- Pain attitudes and beliefs
  - (Reilly 1988, Council 1988, Rainville 1993)
- Fear of harm or injury
  - (McCracken 1992, Al-Obaidi 2000, Kori 1990, Vlaeyen 1995)

Factors Influencing Back Pain Related Disability

- Advice of healthcare providers
  - (Rainville 1995, Rainville 2000, Linton 2002, Houben 2003)

Exercise as a Modality to Reduce Disability

- Exercise performed in a quota-based manor (not dependent on pain) may function as a fear-desensitization process

Exercise as a Modality to Reduce Disability

- Exercise may be viewed a tool for operant conditioning with the goal of extinguishing illness behaviors and promoting wellness behaviors
  - (Fordyce 1973)

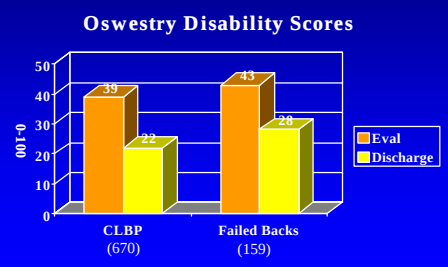
Exercise as a Modality to Reduce Disability

- Aggressive rehabilitation programs all use quota-based exercise
- Effectiveness for reducing disability may be in part due to a change in patients' fears, attitudes and beliefs
  - (Rainville 1993, Rainville 2002)

Exercise as a Modality to Reduce Disability

- In 8 studies of exercise the reduction of disability ranges from 8% to 56%
  - (Taimela 2000, Risch 1993, Mayer 1987, van der Velde 2000, Rainville 1993, Rainville 1997, Rainville 2002, Hazard 1989)
- In all RCTs disability reduction greater in exercise group
  - (Kankaanää 1999, Frost 1995, Mannion 1999)

Exercise as a Modality to Reduce Disability



Summary

- There is no evidence that exercise increases the risk of future back pain or accelerated degeneration
- Exercise is safe for individuals with chronic low back pain

Summary

- There is evidence that exercise can be use to accomplish three therapeutic goals
- 1. Improved impaired back function

  2. Decrease Exercise as Treatment of Impairments in Strength the severity of pain complaints

  3. Reduce disability