Dynamic Chiropractic

REHAB / RECOVERY / PHYSIOTHERAPY

Appropriate Warmup Prior to Rehab. Therapy

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Warming up before exercise is a generally accepted practice.[1] For patients involved in rehabilitative therapy -- and for athletes, also -- it is common to warm up before undergoing activity with the intention of improving performance and reducing the chance of injuries.[2] This is especially true if a strenuous workout is expected. The beneficial effects of warming up are numerous. An accelerated metabolic rate promotes more efficient use of substrates needed to provide energy for physical activity. Increased temperature also reduces the internal viscosity of muscle protoplasm, enhancing the mechanical efficiency of moving muscles. Muscle contraction is more rapid and forceful when muscle temperature is slightly higher than body temperature. An elevated body temperature stimulates vasodilation, increasing blood flow through the vascular bed of muscle tissue and increasing substrate delivery.

An adequate warmup appears to minimize the risk of injury to the muscles, tendons, ligaments and other connective tissues,[3] possibly because of improved elasticity from blood saturation.[4] A warmup may reduce the incidence of subendocardial ischemia and improve blood pressure response to exercise. A warmup should precede participation in any type of vigorous rehab. activity.

The Effects of Warmup

Any effective type of warmup should produce increased muscle temperature. Passive warmup raises the body temperature by some external means, e.g., a hot shower. A general or nonspecific warmup involves active motion of major muscle groups, as in simple calisthenics. Specific warmup focuses on the neuromuscular regions to be used in the anticipated exercise (a rehearsal of the exercise event taking place), making this method the most effective for rehab patients. The intensity and duration of warmup should be individualized according to the patient's physical capabilities. A rectal temperature rise of 1-2 degrees C seems adequate and is usually accompanied by the onset of sweating in normal environmental conditions. Too intense a warmup should not be done too far in advance of exercise, as the body temperature returns to normal after about 45 minutes of rest. Some believe that the benefits of warming up may be related in part to psychologic factors.

Genovely et al.,[5] examined the effects of prolonged warmup exercise at 40% and 68% of maximal aerobic capacity (below and above anaerobic threshold, respectively) on maximal performance in five men who were active regularly but were not highly trained. Maximal performance consisting of two 40-second bouts of maximal pedaling against a 5.5 kg resistance was tested without warmup exercise.

The two bouts of maximal exercise, separated by a five minute rest period, were found to be reproducible for work output and peak blood lactate level. Below anaerobic threshold, warmup exercise significantly increased core temperature with no rise in the steady-state blood lactate level. It did not contribute to improved maximal performance. Above anaerobic threshold, warmup exercise led

to significant increases in both core temperature and steady-state blood lactate level; work output and peak blood lactate concentration on maximal exercise were significantly reduced.

Task-specific, prolonged warmup exercise below anaerobic threshold does not contribute to improved maximal performance,[1] while warmup exercise above the anaerobic threshold impairs maximal performance. This probably is due to glycogen depletion in fast-twitch muscle fibers, which in turn may have contributed to decreased lactate production. These findings apply to short-term maximal exercise in a setting in which the psychologic aspects of testing are rigidly controlled.

In recent years, more flexibility exercises are included in most warmups. The warmup should be exercise specific, and the type of drills used should prepare the patient for the skills they will use. The warming up should not be exhausting and should prepare the patient both physically and mentally for their rehabilitative events.

Static Stretching and Potential Injuries

Patients should not stretch before warming up. Dominguez[6] believes that stretching, particularly static stretching, is a significant cause of injuries. The hurdler's stretch and the plow, in which the patient is supine with the legs raised up and over the head so the feet touch the ground behind the shoulders, are specific examples of static stretching exercises deemed to be harmful. He does favor a 15 minute warmup of gentle range of motion exercises (ROM) for individuals who perform explosive activities, but advises most to merely start slowly and finish with a gentle cool down, bending and rotating the hips, knees, ankles and shoulders. The benefits associated with stretching are attributed to active, controlled exercises, not static stretching itself.

Dominguez[7] also believes that rather than seeking flexibility, most should attempt to develop dynamic ranges of motion. The ability to actively control joints through the full range of motion can be promoted by a combination of gentle flexing, extending, sideways bending and rotation. A good overall program should develop range of motion, strength, power, endurance, balance and motor control. Nothing more than oversized rubber bands (rehab. tubing), balls, teeter boards and balance beams is needed. Dominguez feels there is much room for creativity as clinicians apply general techniques to individual needs.

Benefits of Moderate Flexibility/ROM Exercises

In the past few years, static flexibility exercises have gained a great deal of popularity. However, many clinicians have gone beyond this and are using proprioceptive neuromuscular facilitation (PNF) techniques to increase flexibility. Warnings began to appear in the literature that some of the exercises may actually be harmful. "Bouncing could tear a muscle." "Stretch the muscle and not the tendon." "Hurdler's stretch can damage the medial aspect of the knee." "The plow is bad for the cervical spine." "The ballet stretch is dangerous." However, most believe that flexibility done in moderation, when the muscles are warmed up, can be beneficial. There are obviously some exercises that should be avoided. Attempts should be made in general to stretch muscle bellies and not tendons. This can be done by slightly relaxing the joints which the stretched muscles pass over. Never stretch a cold muscle. Most of the flexibility program should be done at the end of a rehab. program.

Surberg[8] points out that there is an optimal level of flexibility that allows efficient movement while

reducing the risk of certain types of injury. Attainment of this level of flexibility usually is a goal of rehab. conditioning programs. The first step after certain injuries is achievement of normal ROM. Flexibility or ROM can be increased by reducing the resistance of agonist muscle groups or by increasing the strength of opposing muscles. Decreasing the resistance of an agonist muscle group can be accomplished by lengthening connective tissues or by relaxing the myotatic reflex. Certain PNF methods may increase the strength of opposing muscles, whereas others influence agonist muscle groups. Flexibility or ROM exercises include passive or active, and combined active and passive, movements. Passive movements involve guiding a body part through a ROM with or without a prolonged stretch at the end of the movement. Active ROM involves the slow movement of an extremity of body part until resistance precludes further movement. Several variations in these methods exist.

References

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