UGC Approved Journal
Research Link
Since March 2002
An International, Registered & Refereed Monthly Journal : Physical Education
Research Link - 170, Vol - XVII (3), May - 2018, Page No. 58-60
ISSN - 0973-1628 ■ RNI - MPHIN-2002-7041 ■ Impact Factor - 2015 - 2.782

Cryotherapy Treatment in Sportsmen Injuries

The author highlights some of the main effects produced by cryotherapy or cold therapy and discusses how these effects are produced. An attempt is also made to unfold certain myths and misconceptions prevailing about ice therapy amonga the sports persons, coaches and physical educators so that they can use this wonderful modality properly with care and precautions for the treatment of injured sportsmen.

DR. RAJESH KUMAR

Cryotherapy, simply called "Ice therapy" is an external application of ice (cold) for treatment of all acute and certain chronic sports injuries. Besides the hands ice is probably the most convenient, effective, inexpensive and simple treatment tool available for rehabilitation personnel for the management of sports related injuries. It is believed that Cryotherapy, or literally "Cold Therapy "has been used in the medical field since the time of the ancient Greeks and Romans. Ice was used in the 1800s as an anesthetic for amputation. Treating acute sportsmen injuries with Cryotherapy is a method that is around 60 years old in the modern contest. The practice of using ice for rehabilitation for the first time came out of treating soldiers with sportsmen injuries and muscle-spasms at Brooks Army Hospital, San Antonio, USA in the 1960s, and since then it has grown tremendously in popularity.

Various physiological and neurological responses of musculoskeletal tissues to cooling have been well examined. Cold application has been observed to decrease skin, muscle and intra articular temperature, decrease blood flow inflammation, cell metabolism, pain and spasm, and alter nerve and muscle function. However, prevalence of certain myths and misconceptions like following among the students and professional of physical education, coaching and sportsmen has prompted the author to write this paper.

(1) Ice should be used only for initial 24 hours of an injury; thereafter some form of heat should be applied.

(2) Ice application increases the pain, rather than decreasing it.

(3) Cold water can be used in place of ice.

(4) Ice has no place in the rehabilitation in later stages of injury.

Role of Cryotherapy (Ice Therapy) in very acute phase of an injury :

The main reason for using ice or cryotherapy immediately after an acute sports injury is not so much to help the cells destroyed by the initial trauma but to prevent secondary hypoxic injury due to the primary injury. When ice or any other form of cold is used, the metabolism in the tissue is decreased and therefore, the tissue is preserved from secondary hypoxic injury. An injury disrupts circulation and tissue that escaped the initial trauma die from lack of oxygen. Cooling the tissue lowers the metabolism so that the tissue requires less oxygen, and they survive until the circulation is restored.

During immediate treatment, the most important effect of cryotherapy is often thought to cause reduction in blood flow through the local capillary network. However, blood clotting will usually seal these damaged vessels within 3-5 minutes of injury, about the same time as it takes to remove an athlete from the sports field. Therefore, local bleeding may have already stopped before cryotherapy is applied. For this reason, decreased tissue metabolism is thought to be a more important effect of cryotherapy during the immediate treatment of sports injuries.

However, to decrease tissue metabolism effectively, cold application must be given for more than 15 minutes, and this aspect must be considered while treating acute injuries.

Cryotherapy and Swelling :

Generally, it is believed that ice therapy or cold therapy decreases the swelling significantly. But, it really does not. Active exercise or intermittent compression is much better than cold in removing swelling once it has occurred. In this situation, it only decreases the pain to promote further

Assistant Professor (Department of Physical Education), Shah Satnam Ji Boys College, Sirsa (Haryana)

exercise. However, ice application immediately after an injury can prevent oedema or swelling to some extent by limiting fluid infiltration into the area, affecting decreases permeability of the blood vessel wall to inhibit inflammatory reacting and retard blood flow. With decreases secondary hypoxic injury, there is less free protein and therefore less tissue entotic pressure to attract fluid.

Theoretically, vasoconstriction and inhibition of mediator release should prevent swelling. However, experimentally produced inflammatory reactions in animals that were treated with cold have actually demonstrated more swelling than untreated controls. A possible explanation for such an effect would be capillary damage caused by cold induced ischemia. Blood flow into damaged vessels after cooling is discontinued would cause swelling to occur. This hypothesis is supported by evidence that swelling the swelling will take place even in uninjured tissue after exposure to cold. However, more research is needed to clarify the effect of cold application on swelling.

Cryotherapy and Blood Flow :

There is some disagreement among the researchers that ice or cold therapy application causes reflex vasodilatation and an increase in blood flow. This finding was actually observed during early researchers on cryotherapy (Lewis Hunting Reaction). However, in reality it does not do so. In fact, in some cases, sometimes there is a limited reversal of construction of the blood vessels at very low temperature and it was misinterpreted as vasodilatation and greater than normal blood flow. Likewise, the appearance of redness in the skin with ice application was related to increased blood flow to the area. The explanation for this is that with decreased metabolism, there is more oxygen in the blood which appears redder. It is also said the redness is related to a nerve reaction rather than a blood reaction to the cold.

Cryotherapy and Pain Reduction :

Ice therapy or cryotherapy is often used to decrease pain in acute care situation. The exact mechanism how this effect is produced in the body is still the subject of speculation. However, the researchers in the field believe that cold induced pain inhibition is due to some neural reflex mechanism. One such mechanism "Get Theory of Pain" explains pain relief. According to this theory, the ice or cold application stimulates sensory nerves greatly enough, and the brain concentrates on that stimulation, and closes the gate to the pain stimuli. In other words, only one impulse is having access to the brain at one time. The sensory cortex of the brain concentrates on the sensory stimulation of the cold, rather than the pain, and hence, the pain is blocked.

There was earlier presumption that ice or cold therapy decrease the temperature of nerve and therefore, the decreased nerve conduction velocity can reduce the pain. This theory has now been rejected as in a therapeutic situation we cannot cool the tissue enough to get the rate of conduction low enough to decreases the pain the ice application produces different responses in the tissue in relation to the duration of its application. Though ice therapy reduces pain, however, the immediate response to ice application is a short lived (5-60 seconds) dull pain, which is more intense in some individual than others. After this, pain reduction occurs.

Ice massage is particularly useful for pain relief in smaller tissue area, which is carried out until cold anesthesia ensure. The usual sensations are of cold, then burning, deep aching, and finally numbness prolonged ice application or cryotherapy, but underlying tissue temperature will continue to fall.

Cryotherapy used in Rehabilitation - Cry kinetics :

Cryotherapy in combination of active exercise in referred to as Cry kinetics, and is applied in rehabilitation of injured athletes when they are recovering from severe injuries. In the later phase of rehabilitation, the numbness or reduced pain with ice application allows a patient to perform exercise and activity easier and better. Many therapists use ice before, after and during stretching exercise or application is used to augment the effects of exercise and manual therapy.

Various studies have revealed that cryotherapy applied for a joint injury, affect surrounding muscles differently than direct muscle cooling does. During rehabilitation of a joint injury, the supporting and surrounding muscles are often weak, atrophied or inhibited but are not damaged. Cooling a joint in pathological and normal subjects facilitate muscle activity better that ultimately stabilize the joint.

For rehabilitative purposes, application of ice for 20 minutes is usually adequate to dull the pain to allow for heightened activity. However, for immediate care, cold and compression should be used for longer than 20 minutes but probably not more than 30 or 40 minutes at a time, which can be repeated few times a day. Compression however should be used continuously for 24 to 48 hours following injury.

Why should ice be used instead of cold water? :

Cryotherapy can be applied in various forms but the most frequent and most effective is just plain ice. Plain ice exerts the most cooling from the phase change at the melting point, when the solid ice is turning to liquid water. To understand how ice application works, it should be learnt that coldness is merely the absence of heat.

It is also important to know that any topical spray, gel or ointment that gives a sensation of coldness does not actually cool the body tissue. The other effect of chemicals contained therein are not cryotherapeutic.

Precautionary Measures :

Despite the popularity and wide application of ice therapy in sportsmen injuries, there is some controversy regarding the use of ice. The clinicians should think more critically about ice or cold application and avoid its indiscriminate use during treatment and rehabilitation of injured athletes. Cryotherapy is a powerful clinical tool, however it also places certain unwanted stresses to the body because of its influence on the sympathetic nerve activity. Few examples are cited here in supported of this:

(1) During ice-water immersion of the hand, increase in blood pressure, heart rate, cardiac out and sympathetic nerve activity have been observed.

(2) Icing or cooling a body part may evoke changes in muscles at far distant body part.

(3) During cooling of the axilla, certain changes in neuromuscular recruitment in the soleus muscle of the leg have been observed.

(4) Ice application to left shoulder after an injury is reported to influence the cardiac activity in unstable cardiac patients.

The above mentioned examples are enough to warrant careful and judicious use of cool therapy; however it continues to remain a very well established modality in the treatment and rehabilitation of musculoskeletal injuries. The clearly positive effects of cold in the treatment of acute injury certainly appear to outweigh any possible negative effects caused by increased swelling or otherwise. Though there is need for more research and clinical investigation for its application, however, it must be used with care and precautions.

(a) The clinician must use ice optimally for real therapeutic effects. For example, to prevent swelling, it needs to be applied within minutes after the injury occurs. It is waste of time to apply ice hours after or next day in an ankle sprain to decrease swelling.

(b) Cryotherapy should be used differently in the acute and sub acute phases of injury. In the acute phase of injury rehabilitation, cryotherapy reduces secondary hypoxic and enzymatic injury. In the sub acute and functional phases, it decreases pain and facilitates active exercise and activity.

(c) While treating a body part, periodic checkups are required. For example, while icing the knee, make sure that the sensation in the patient foot and lower leg remains intact.

(d) After an injury, ice application may be done by a co-player, coach or therapist so that the athlete relaxes, and his body is helped to better handle and absorb the byproducts of inflammation.

(e) Extra precaution must be exercised with cold applications if an athlete suffers from Reynaud's Syndrome (a disease which causes paroxysmal spasm of the occasionally resulting in gangrene). Likewise, ice with compression should not be applied over a superficial nerve such as the ulnar nerve in the arm.

References :

(1) *Colan, B.J. : "Therapeutic use of Cold", Advance for Physical Therapists, USA, February, 1995.*

(2) *Cornelius, W. and Jackson, A. (1984) : "The Effects of Cryotherapy and PNF on Hip Extensor Flexibility", Athletic Training, 183-184, fall.*

(3) *Knight, K.L. (1985) : Cryotherapy: Theory, Technique and Physiology, Chattanooga, TN.*

(4) *Krause, B.A. : "Neurological Responses to cold", Athletic Therapy Today, 8(4), 59-61, July 2003.*

(5) *Knight, K.L. (1955) : Cryotherapy and Sports Injury Management, Champaign, IL: Human Kinetics.*

❁❁