CRYO

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The Role of Cryotherapy in Preventive Medicine

Various types of cryotherapy have shown a wide range of benefits in managing and treating different health conditions, particularly in reducing inflammation related to rheumatism and sports injuries. Aside from being considered as a curative technique, the results of several scientific studies have also revealed the potential benefits of cryotherapy in preventive medicine, such as in averting migraine attacks, asthma exacerbation, early onset of Alzheimer's disease (AD) and the occurrence of hair loss or alopecia among cancer patients undergoing chemotherapy.

One of the most common applications of cold therapy is in the management of migraine. Its benefits are associated with the cooling of blood passing through the intracranial vessels, which can be achieved by applying two freezable ice packs on the neck targeting the carotid arteries. This method is commonly referred to as targeted neck cooling. In addition, such benefits are also attributed to the effects of cold temperature in minimizing edema by decreasing vascular permeability leading to a reduction in the release of inflammatory mediators (Sprouse-Blum, Gabriel, Brown, & Yee, 2013).

Aside from this, cryotherapy has also been used in the prevention of acute asthma exacerbation. In fact, in a study conducted by Yamauchi (1988), it was found out that exposure to intense cold temperature (up to -175 degrees Celsius) for several weeks in Japan improved the lung function of asthmatic patients. This was supported by the study of Engel et. al. (1989), which revealed that such condition can induce a transient bronchodilatory effect (Westerlund, 2009). Moreover, apart from its influence on the respiratory response, exposure to cold temperature can also decrease the levels of histamine (Wojtecka-Lukasik, et al., 2010). Histamine is an inflammatory mediator associated with the pathology of allergy such as asthma (Dunford & Holgate, 2010). Hence, with these benefits, it can be taken into account that cryotherapy can exert huge benefits as an adjunct intervention in asthma treatment and prevention.

On the other hand, it was also postulated that cryotherapy can also exhibit potential benefits in preventing the early onset of AD through vascular and inflammatory response alteration and oxidative stress reduction. This premise was supported by preliminary experimental studies showing the effects of cryostimulation in increasing the level of anti-inflammatory cytokines, such as IL-6 and IL-10, and in decreasing the production of pro-inflammatory cytokines, including IL-1a, IL-2, and IL-8. Moreover, cryotherapy also showed antioxidant properties as it can support the activities of glutathione peroxidase and glutathione reductase, and increase the concentration of antioxidants, particularly extra erythrocyte hemoglobin and uric acid (Misiak & Kiejna, 2012).

In addition, cold application has also shown significant impact in averting hair loss related to chemotherapy. This method is called scalp cooling, which has been practiced for decades in preventing chemotherapy-induced alopecia (CIA). Evidences have shown that the mechanism behind scalp cooling is related to the effect of cold temperature in inducing vasoconstriction that reduces the supply of blood in the patient's hair follicles in the period of peak plasma concentration of certain chemotherapy agents. Moreover, scalp cooling is also known to reduce the rate of metabolism and biochemical activity which makes the hair follicles less vulnerable to the damage caused by chemotherapy. Some of the most common methods of scalp cooling are the use of ice bags, frozen cryogel packs and caps that can promote an endothermic cooling

reaction. However, these methods are associated with frequent and regular cap changes, which demands much effort to ensure effectiveness. With the advancement in cryotherapy technology, the development of continuous cooling machines that use liquid circulation and a one-size-fits all system have shown much potential in promoting a cost-effective intervention to prevent CIA (Breed, an den Hurk, & Peerbooms, 2011).

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