Contribution of Cryogenically Cooled Air on Wellness

Cold therapy is probably one of the oldest treatment modalities. Regular application of cold material on painful or inflamed parts of the body improves symptoms by alleviating pain by decreasing blood flow to the inflamed organ or body part, thereby decreasing sensation. People noted this phenomenon hundreds, if not thousands of years ago. Controlled local application of ice packs is an ordinary treatment in modern rheumatology. Application of coldness on almost the whole body has been used for centuries through a widely present practice of cold water swimming. There are many cold water swimmers in present time. These people, carried by some innate feeling, try to achieve a higher level of health through this practice. The modern version of the application of cold objects on the whole body is whole body cryotherapy. This novel wellness modality has significant potential to improve symptoms in different diseases, but also it improves general health. Cryogenically cooled air which is used in whole body cryotherapy has a temperature of - 100°C and lower (Lubkowska 2012). Cold application in whole body cryotherapy procedure is strictly controlled. Duration of a single session in a suitable chamber, with a patient in minimal clothing, is one to three minutes (Westerlund 2009). The procedure was originally introduced in 1978 by Prof. Toshiro Yamauchi and his team in Japan (Lubkowska 2012). In this pioneering achievement, whole body cryotherapy was used for the treatment of rheumatism. Until today the list of potential indications became significantly longer. Strictly controlled use of cryogenically cooled air has a target to achieve a temporary decrease in body temperature. This transitory drop in body temperature results in certain desirable physiological changes. Some of the favorable physiological responses include an increase in hormones such as beta endorphins and norepinephrine, and stimulation of blood flow (Lubkowska 2012). Repeated sessions of whole body cryotherapy has a potential to result in therapeutic effects. The scientific popularity of the procedure has skyrocketed in its short history. There are numerous scientific articles about its existing and possible role in the treatment of different diseases. The primary indication for whole body cryotherapy, rheumatism, is also existent today. The procedure has a positive impact on pain, fatigue and walking time in rheumatoid arthritis patients (Giziń ska, Rutkowski et al.2015). Other rheumatological and orthopedic conditions, such as ankylosing spondylitis and tendinitis, are also indications for the treatment in cryochambers (Lubkowska 2012).

Many individuals who repeatedly used the procedure for other reasons noted psychic benefits of it. Their mood improves, same as a sleep. Scientists have examined this phenomenon and proposed a role of whole body cryotherapy as a useful adjunct treatment of depressive and anxiety disorders (Rymaszewska,Ramsey & Chł adziń ska-Kiejna 2008). The procedure has a positive impact on sleep quality (Lubkowska 2012). The use of cryogenically cooled air has found its place as the helpful treatment in the complex disease such as multiple sclerosis.
Cryotherapy sessions result in improving functional status and fatigue in multiple sclerosis patients (Miller, Kostka et al. 2016). There are sound theoretical models which support the possible role of whole body cryotherapy in weight loss and immunity. It is important to say that use of the treatment is not limited to pathological states. Whole body cryotherapy is regularly used by many athletes because of its potential to speed recovery (Lubkowska 2012). In fact, the positive impact of cryogenically cooled air is there for everyone. Whole body cryotherapy is our new weapon in achieving wellness and adjunct treatment of numerous diseases.

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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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