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Original article

THE ROLE OF AQUATIC EXERCISES IN BREAST CANCER PHYSICAL REHABILITATION

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Abstract

Hydrotherapy has been recognized for its therapeutic benefits since ancient times, with the Greeks and Romans utilizing water for medicinal and recreational purposes. Over the centuries, hydrotherapy has evolved into a structured practice, contributing to rehabilitation and pain management. This paper explores the effects of hydrotherapy on breast cancer patients, particularly post-mastectomy, addressing its role in alleviating treatment side effects such as pain, lymphoedema, and reduced mobility. Research indicates that aquatic exercices improve joint flexibility, muscle strength, and overall well-being, reducing symptoms associated with chemotherapy and radiation therapy. Hydrotherapy's buoyancy and resistance facilitate movement, making it a viable rehabilitation method for individuals with limited mobility. Studies highlight its effectiveness in reducing lymphoedema, enhancing psychological health, and improving upper limb function post-mastectomy. Given the physiological and psychological benefits, hydrotherapy emerges as a valuable adjunctive therapy in breast cancer rehabilitation.

Keywords: Hydrotherapy, Breast Cancer, mastectomy, rehabilitation, aquatic therapy, lymphoedema.

Introduction

Ancient Greeks believed that water had medicinal properties, and the Romans constructed public bats that served as both recreational and therapeutic facilities. These baths were the ancestors of modern spa resorts, and hydrotherapy has been around since then. During the 19th century, the Austrian hydrotherapist Vincenz Priessnitz believed that shock therapy with cold water could enhance the immune system activity and promoted the idea that the usage of wet cold bandages could accelerate the healing process of broken bones. On the contrary, during the same period of time, Sebastian Kneipp, a German Catholic priest and the forefather of naturopathic movement, used sauna and hot water baths for tense muscles, relaxation and different ailments. As time passed, in the 20th century, the alternation of warm and cold showers and the aquatic exercises were increasingly used in order to reduce swelling, stiffness and joint pain (Chowdhury et al., 2021).

Aquatic therapy includes water exercises, often done in a therapeutic pool, while being supervised by a physical therapist. The purpose of the exercises is to increase joint mobility, muscle suppleness and overall body muscle strength. This type of therapy concept has the advantage that the hydrostatic water makes the exercises applicable to different conditions, such as: neurological, orthopedic, oncological and rheumatologic (Becker, 2009). Swimming relaxes and reduces tense muscles, enhances nervous system function, diminishes body weight and improves heartbeat and breathing rhythm (Tanaka, 2009), which allows the execution of movements without pain. Therefore, following an aquatic training program, shoulder pain was shown to have decreased (Barbagelata et al. 2021).

Breast cancer appears as a result of abnormal multiplication of the cells in the breast ducts and mammary lobule. It is the most prelavent type of cancer that affects women, impacting around 2.09 million people globally, according to the World Health Organization's most recent reports from 2022.

As stated by the US National Cancer Institute, smoking, a sedentary lifestyle, a diet deficient in vitamins and minerals and persistent viral infections, including helicobacter virus, papillomavirus (HPV), hepatitis and Epstein-Barr virus, are the main risk factors that lead to the development of breast neoplasm.

Chemotherapy and radiation therapy are used together with mastectomy or sectorectomy as a complex treatment for breast cancer, which is develop by a myltidisciplinary team. Chemotherapy and local radiation therapy are used after surgery to reduce the chance of cancer recurrence. Despite the fact that adjuvant treatment lowers mortality, these treatments have the following side effects (Shapiro & Recht, 2001): cardiovascular disease, pain, lymphoedema, decreased mobility of the shoulder joint, peripheral neuropathy, premature menopause, weight gain, anxiety, depression, insomnia, fatigue. One of the most frequent adverse effects of treatment for breast cancer is lymphoedema, which can be treated with swimming and hydrotherapy in addition to the decongestive therapy (Yeung & Semciw, 2018). Following the administration of oncological, surgical and hormonal treatments, dysfunctions that impair daily functioning and play a role in the development of anxiety, depression and insomnia manifest.

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Breast cancer treatment side effects

The side effects that occur during the administration of adjuvant treatment have a negative impact on quality of life, and quality of life is an important factor in the prognosis of a breast cancer patient (Browall et al., 2018). As we know, exercise enhances the physique but also the physiological response to treatment. Irwin et al. (2011) emphasizes the role of performing physical activities (such as Nordic walking or swimming) in decreasing post-treatment mortality.

Patients with breast neoplasms may experience symptoms of other illnesses including fibromyalgia and rheumatoid arthritis after treatment, which hydrotherapy might help with (Reger et al., 2022). Aquatic exercises can be used for a wide range of purposes, including building muscle strength, lowering chronic pain and improving joint mobility. An accumulation of protein-rich fluid (lymphatic fluid) in the interstitial space is diagnosed as lymphoedema and it is brought on by the removal of axillary lymph nodes which creates a breach in the lymphatic circulation (Letellier et al., 2014). All physical therapy techniques, both specialized and non-specific, including hydrotherapy, cand be used to manage the lympheodema. Therefore, we conducted a comprehensive documentation to emphasize the effects of hydrotherapy on various body systems and post-mastectomy sequelae. Thus, based on the international literature, we carried out a thorough documentation to highlight the effects of hydrotherapy on post-mastectomy sequelae.

Pain and keloid scar formation following mastectomy operation and axillary lymph node dissection causes reduced range of movement in the joints of the upper limb. Transitional post-surgical pain manifests as a result of muscular and ligamentous tears inflicted upon the patient during surgical intervention (Jung et al., 2003) and can be exacerbated due to the effect of chemotherapy and radiotherapy.

The most problematic side effect of breast cancer treatment that lowers patients' quality of life is decreased mobility and, consequently, functionality of the upper limb joints (Kaya et al., 2010). We may take physical action to address lymphoedema, one of the most common side effects of breast cancer treatment. Although there is no specific criterion for diagnosing lymphoedema, the US National Cancer Institute states that a difference of 2 cm from prior measurements or when compared to the contralateral limb indicates oedema.

Hayes et al. (2008) examined the prevalence of mastectomy-related lymphoedema. Using bioelectrical body impedance in conjunction with a questionnaire about the impact of lymphoedema on their quality of life, 287 patients with invasive breast neoplasms were assessed over the course of 18 months. This study found that six months after surgery, 33% of patients experienced lymphoedema. Additionally, the authors believe that lymphoedema is a public health issue that requires systematic surveillance for early diagnosis and specific attention.

Various particular and non-specific kinetic means must be applied, either totally or partially, depending on the patient's somatic and functional characteristics and the period of application, in order to achieve functional recovery in operated breast neoplasms.

The effects of hydrotherapy on the body

As "an approach which uses water and its characteristics to maintain health, prevent and cure diseases" (Almassmoum et al., 2018), hydrotherapy involves performing exercises or motions with the body submerged. For this reason, it is crucial to the medical recovery following a mastectomy. In order to maximize the positive benefits of hydrotherapy, patients with breast neoplasms can benefit from the implementation of physiotherapy concepts based on the principles of hydrostatics and hydrodynamics (Siqueira et al., 2020). Swimming pools, bathtubs, and basins can all be used for partial or complete immersion. Srámek et al. (2000) found that immersion in water at three different temperatures (32°C, 20°C, and 14°C) for one hour had varying impacts. In comparison to controls at room temperature, immersion at 32°C reduced heart rate by 15%, systolic blood pressure by 11%, and diastolic blood pressure by 12%, but it had no effect on metabolic rate. In addition to heart rate and blood pressure, diuresis was raised by 107% while plasma renin activity, plasma cortisol, and aldosterone concentrations were decreased by 46%, 34%, and 17%, respectively.

Water has been believed to aid in healing and be helpful for several kinds of medical ailments since the beginning of recorded history. within time, healers all around the world have observed the impact of water on numerous kinds of medical issues, as both natural springs and water-based therapies have been the main focus of many health promotion facilities. The various biological properties of water have led to the development of healing techniques based on aquatic treatments through observation, centuries of trial and error, and continuously updated scientific methodology. Medical hydrology is the term used to describe the external therapeutic application of water throughout the past few decades, typically through partial or complete body immersion to achieve these biological effects (Antonelli et al., 2021).

Because energy must still be dispersed, the body employs another process that permits energy to be lost through the latent heat of sweat evaporation and respiratory failure, thereby chilling the skin. This method is quite effective since the body cools by 0.94°C when 2.5 ml of water evaporates. The second situation has been the realization that imponderability can be best simulated in water immersion (Haffor et al., 1991).

The beneficial biological effects of body immersion extend to all homeostatic systems. Water can be utilized therapeutically for a wide range of illnesses, including breast cancer, because of these immediate and long-term effects.

Hydrotherapy in breast cancer

The most significant water-related factors affecting the body in patients with breast cancer are mechanical ones. Based on Archimedes' Law, the buoyant force causes the body's weight to appear to decrease, which is directly correlated with the depth of submersion. Exercises and mobilizations can therefore be carried out even with patients who are unable to execute them on land. This facilitates the biomechanics of movement.

Every movement is accompanied by water resistance, which enables weight-bearing exercises to be done in any direction. Hydrokinetic therapy is used as part of kinetic treatment by specialists from the Földi European Lymphology Centre (Földi College). They recommend that the water temperature be between 22°C and 30°C.

After surgery, freestyle swimming is advised because it helps to increase upper limb range of motion and offers mild stretching. Swimming is a significant form of aerobic exercise employing water resistance and has several cardiovascular advantages both before and after chemotherapy (Devoogdt et al., 2010).

When swimming, keeping the body horizontal reduces heart rate and increases cardiac output. Patients who may have skin irritations that high chlorine water can aggravate require permission from the attending physician before swimming while receiving local radiation therapy (Pittinger & Graves, 2013).

In a study at the Benha Teaching Hospital, Mohammed, Mahran & Aboelazm. (2014) noted that hydrotherapy offers advantages for the scapulohumeral joint's abduction movement. 30 patients benefited from a 6-week water exercise program that was done three times a week; by the end of the treatment, the patients' shoulder pain had subsided and their functional level had increased.

In a study conducted in Iran, Tofighi, Babaei Bonab & Alizadeh (2020) examined the psychological consequences of hydrotherapy. The authors observed a statistically significant improvement in quality of life, particularly in cognitive flexibility, after implementing an aquatic fitness program three times a week for six weeks. Similarly, aquatic exercise helped minimize the fatigue that patients experienced after receiving therapy, according to Lin et al. (2021).

In a meta-analysis, Gupta (2022) highlights the significance of applying a complex post-operative treatment consisting of physical therapy, yoga, hydrotherapy, compression bandaging, psychotherapy, and melotherapy. According to Hack et al. (2015), these treatments are good for quality of life, mastectomy-related lymphoedema, and discomfort and impairment in the upper limbs.

Studies (Bills et al., 2017) find that hydrotherapy has a significant impact on lymphoedema reduction, one of the post-mastectomy sequelae. This study indicates that hydrotherapy is used in certain treatment facilities in Australia to treat lymphoedema. According to Tidhar and Katz-Leurer (2010), hydrotherapy helps lymphedema quickly, but all kinetic methods, both particular and non-specific, must be used over time.

Compared to conventional water aerobics workouts, slow-paced aquatic exercises had significantly greater impact on lymphoedema (Deacon et al., 2019). Siqueira et al. (2020) found that the shoulder range of motion improved in the abduction, flexion, extension, internal rotation, and external rotation motions after a 12-week post-mastectomy aquatic training program.

An exercise program conducted three times a week in a pool with a depth of 140 cm and water temperatures between 30 and 32°C was suggested by Cantarero-Villanueva et al. (2013) for individuals experiencing pain brought on by hormone medication. A 60-minute session was structured as follows: aerobic activity for 15 to 20 minutes, mobility exercises for 15 to 20 minutes, recovery exercises for 20 minutes, and a 5-minute warm-up. After 24 sessions, the authors saw a reduction in pain. Additionally, it was shown that working out in a 200 cm deep pool with 28°C water decreased feelings of weakness, anxiety, and sadness (Cantarero-Villanueva et al., 2013).

Discussions

A limited amount of research has been conducted on the impact of hydrotherapy on various human bodily systems. Many researchers have created studies to examine how swimming and hydrotherapy affect cancer patients' recovery, particularly in cases of breast cancer.

A land-based exercise program and water therapy were compared by Fernández-Lao et al. (2013) with the goal of lowering lymphoedema and improving shoulder joint mobility, muscular strength, and functional level in daily living activities.

These authors claim that using water treatment produces effects considerably more quickly, but in order to maximize and sustain the benefits over time, all the different physical therapy techniques must be combined. Since hydrotherapy has been shown to improve patients' quality of life, reduce fatigue, and treat adverse effects (Mur-Gimeno et al., 2021), it has been suggested that its use as an alternative method for breast cancer patients be replaced by its inclusion as a composite part of post-surgical procedures (Wang et al., 2022).

In the treatment of lymphoedema, the principles of hydrotherapy are represented by buoyancy, which makes it easier to mobilize the upper limbs, water's viscosity, which makes it easier to tone the muscles that pump blood to lymphatic vessels, and hydrostatic pressure, which applies pressure to the limbs that is comparable to that of compression sleeves, creating a real massage that reduces the circumference of the affected segment. Massage, water exercise, land-based exercise, lymph tape, and multilayer compression bandaging are all part of the decongestive treatment for lymphoedema (Marchica et al., 2021).

According to Ali, Gammal & Eladl (2021), the inclusion of aquatic physical therapy in the recovery protocol improves the effectiveness of treatments for patients with post-mastectomy lymphoedema; in certain cases, the outcomes can be even more remarkable than those of a traditional physiotherapy program.

Conclusions

A limited number of studies have examined the impact of hydrotherapy as an adjuvant treatment for breast cancer in patients with lymphedema. Despite the advantages and disadvantages, we think hydrotherapy might be used as an adjuvant treatment for breast cancer patients who also have lymphoedema and reduced muscle strength and mobility. As long as hydrotherapy is administered in a group setting, it has beneficial physiological and psychosocial effects because it promotes socialization and, more specifically, acceptance of the situation that these individuals are dealing with. However, there isn't much literature on the subject this paper discusses. The survival rate following a breast cancer diagnosis has grown as a result of advancements in treatment techniques.

As a result, researchers and writers shifted their focus from mortality to morbidity and started analyzing and advocating for physical activities that would support patients' socio-professional reintegration. Under these circumstances, hydrotherapy may be useful for treating and preventing sequelae. Any swimming activity that is done in water no deeper than chest level qualifies as recreational. Above this point, water can become stressful due to two factors: the loss of stable support and breathing maladaptation.

Authors` Contribution

All authors have equally contributed to this study.

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