School of Podiatric Medicine
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The Effectiveness of a Magnesium Sulfate Salt Soak in Lymphedema Reduction

Epsom salt in a whirlpool may reduce foot and leg edema.

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Purpose

The objectives of this case study are to determine the efficacy of a simple Epsom salt product (GSY*) for the reduction of leg and ankle circumference in diabetic patients previously diagnosed with chronic ulcerative lymphedema. Chronic lymphedema is a major risk factor in production of leg ulcers. Effective management to reduce edema can limit this risk factor.

Hypotheses

If a diabetic with chronic ulcerative lymphedema undergoes a warm water whirlpool soak with GSY Epsom salt added, there will be a greater decrease in leg and ankle circumference versus the same warm water whirlpool.

Literature Review

A normal lymphatic system consists of blind-eye vessels which collect the fluid that bathes and nourishes the tissues. In a normal system, this fluid, called lymph, is derived from the arterial side of capillaries, and is returned to the circulation via veins in the inguinal region.[1] Nearly 90 percent of the water component in our blood is consistently filtered through the lymphatic system while the remaining ten percent is found in the tissues. The purpose of the lymphatic system is to help the body maintain fluid balance while filtering out waste products.[2] White blood cells and other immune cells congregate in lymph nodes in various parts of the body (notably the axillary and inguinal region). They help to destroy bacteria and cancerous cells, and remove other wastes that make their way into this lymph fluid.[3]

In more severe cases of lymphedema the skin and support structures become fibrotic and develop fissures. These become portals for bacteria, which may lead to cellulites.[4] Furthermore, skin folds may macerate, producing cutaneous disruptions or creating an environment that may harbor bacterial or fungal infections. It is very important to be careful about injuring skin. Areas between fingers and toes or under skin folds should be kept dry to avoid fungal growth, and the limb should be checked frequently for any changes in color or temperature.[5] Advanced lymphedema is generally associated with leakage of lymph from the skin. This can be associated with maceration (breakdown) of skin or from papilloma (blister-like bubbles) that open and lead to chronic oozing and increased risk of papules.[6]

Not only can wounds contribute to lymphedema, but uncontrolled lymphedema can hamper healing and contribute to infection. The reasons for increased rate of infection are three-fold. 1) The lymphatic system (which normally helps to carry bacteria away from tissue and destroy them) is compromised, thereby leading to a build-up of bacteria[7]. 2) The oxygen

and protein-rich lymphatic fluid is a breeding ground for bacteria.[8] 3) Macrophages are not as efficient in the lymph fluid as in fluid bathing tissues.[9]

Unfortunately, there is no consensus regarding standard treatment for lymphedema. There has been limited controlled research on the efficacy of individual treatments, let alone their combination. Often, treatment options are selected individually based on past medical history, amount of edema, lifestyle and insurance/financial situation. The most commonly suggested treatment involves decongestive physiotherapy, which include the use of compression devices (compression bandages/sequential lymphatic pumps) and manual lymphatic drainage (a gentle massage).[10]

Materials and Methods

- Four diabetic patients with chronic lower extremity lymphedema and ulcerations were selected for this study.
- All patients had Profore™* four-layer dressings on their affected lower extremities upon entry to the wound care center.
- The Profore™ dressings were comprised of natural padding bandage, light conformable bandage, light compression bandage, and flexible cohesive bandage.
- Profore™ four-layer compression dressings were removed prior to the start of the whirlpool treatment.
- The whirlpool was filled with 20 gallons of water. The whirlpool used in this study was Hydromassage Subaqua Therapy Tank manufactured by Ille Electric Corp.
- The temperature of the whirlpool was standardized to 98°F.
- One ounce of Chlorazene® disinfectant was added to the whirlpool in both GSY epsom salt and plain water treatments.
- One lower extremity of the patient was selected for standardized measurements.
- The measurements were decided based on the lower extremity that had ulcers. If ulcers were present bilaterally then the choice was based on which lower extremity presented with greatest circumference and lymphedema.
- The set measurement marks were placed at 12 centimeters and 30 centimeters, proximal to the plantar aspect of the foot.
- Circumferential measurements were taken at the two marked sites prior to the whirlpool treatment.
- If the patient was given the GSY epsom salt treatment, than 22 ounces (two full coffee mugs) of GSY epsom salt was dissolved in the whirlpool along with Chlorazene®.
- If the patient was given the plain water treatment than only Chlorazene® was added to the whirlpool.
- The patient was placed in the whirlpool from the knee level down for 30 minutes.
- After 30 minutes, the patient was dried and circumferential measurements were taken again at the marked points.
- Appropriate wound care treatment was administered according to the patient's needs and Profore™ four-layer compression dressings were reapplied.

Results

Discussion:

- In the current study, the GSY Epsom salt product notably reduced the circumferential size measurements at both ankle and mid-calf area in each diabetic patient when compared to just plain water.
- The GSY Epsom salt whirlpool treatment can be used to decrease edema resulting from trauma, post-op complications, and athletic injuries.
- The GSY Epsom salt treatment is inexpensive, simple to use, and can be used at home by the patient.
- This may be an adjunct to compression wrap treatments of lower extremity edema, lymphedema, and venous insufficiency.
- Our future hope is to carry out consecutive trials in our patient group and assess the mechanism of action.
- Limitations of this study were:
  -Small patient group.
  -Time out of compression dressings and into the whirlpool varied.
  -Measurements were subjective.
  -Lack of consecutive trials.

Conclusions

The hydrostatic pressure gradient provided by a whirlpool is responsible for fluid movement from more distal areas to the more proximal limb. Epsom salts have long been used in the treatment of musculoskeletal disorders producing pain and edema. No studies or papers have been written on the effects of the combination of water and magnesium sulfate salts in reduction of edema in the extremities. GSY Epsom salt when used in combination with whirlpool treatment has been shown to reduce circumferential measurements in chronic lymphedema patients. Possible mechanisms for the increased reduction in circumference would include osmotic, physical or biochemical effects. Further studies are needed to determine the mechanism of action that causes the increased movement of fluid from the limb.

*GSY Epsom salt(Jumbo Gems)—"Go Soak Yourself" epsom salt, manufactured by PQ Corporation, 1200 West Swedesford Rd., Berwyn, PA 19312

* Profore™-- Profore™ four-layer bandage system, manufactured by Smith & Nephew Wound Management, PO Box 81, 101 Hessle Road, Hull, HU3 2BN, United Kingdom

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