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HYDROTHERAPY IN MUSCULAR DYSTROPHY – A CASE REPORT

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ABSTRACT

Muscular dystrophy is a group of diseases that cause progressive weakness and loss of muscle mass. Aetiology being mutated genes that interfere with production of proteins essential in building and maintaining healthy muscles. There are different types and there is no cure for any form of muscular dystrophy. But treatment can help prevent or reduce problems in the joints and spine; to remain mobile as long as possible and to have better quality of life. There forth a dynamic and comprehensive physiotherapy program is highly recommended for its management. Hydrotherapy or aquatic exercise therapy is an integral part of Physiotherapy along with electrotherapy, exercise therapy and massage therapy. Hydrotherapy is a unique technique of working in water to help patient perform movements including painful conditions with great ease. Person with such alignments suffer from muscle weakness as well as joint stiffness/deformities. Buoyancy of water helps release body weight on joints and person finds it easy to perform the movements. Resistance by water while doing movements adds on in maintaining the muscle power. Sessions were conducted at a frequency of once in a week and the range of motion of all joints were maintained the same for an extended period of six months of study conducted. In a progressive disorder, maintaining joint mobility and muscle power is appreciable. Hence considering potential benefits of hydrotherapy, it can be choice of management in muscular dystrophy cases for optimal benefits.

Keywords: Hydrotherapy, aquatic exercise therapy, buoyancy and muscular dystrophy.

1. INTRODUCTION

Muscular dystrophies are a heterogeneous group of inherited disorders with gradual degeneration of the muscle fibers. These are differentiated into syndromes based on the mode of inheritance, the age of disease onset, course of the illness and distribution of muscle weakness. There is currently no cure, but physical therapy and medical treatments can improve symptoms and slow the progression of disease.^[1] In such conditions of progressive deterioration of muscle power hydrotherapy can be one of the best choice of management. Hydrotherapy was formerly also known as 'hydropathy' or 'water cure'. Hydrotherapy involves a range of methods and techniques, many of which use water as a medium to facilitate thermoregulatory reactions for therapeutic benefit. Hydrotherapy shall be opted for rehabilitation considering its potentials in painful conditions like osteoarthritis, rheumatoid arthritis, post-fracture or post-operative mobilization and other musculoskeletal disorders. Hydrotherapy in paediatric user group with such ailments, ensuring patient satisfaction and compliance is better compared with hydrotherapy than land-based physiotherapy. Buoyancy of water makes exercising easy compared to that done outside. Hydrotherapy differs from swimming and aquaerobics since hydrotherapy generally focuses on slow, controlled movements and relaxation.^[2, 3]

2. DYNAMICS TO BE CONSIDERED FOR HYDROTHERAPY

As per *Archimedes's Principle of buoyancy*, body immersed in a liquid experiences an upward force equal to the weight of the displaced liquid. This is why the body feels less weight in water than on land, this is also the principle behind hydrostatic weighing. A perpendicular pressure against the surface of the body exerted by water is called 'hydrostatic pressure'. This pressure increases as the

depth and density of the liquid increases. This is why a motion is performed more easily near the surface of the water than at greater depths. Water molecules have a tendency to attract each other. As a result, molecules are 'cohesive'. This causes an increase in resistance to range of motion, compared to that of the air. 'Viscosity' is an internal friction that directly depends on the speed of the liquid.

To brief it out, speed, viscosity and resistance to the movement are directly proportionate, higher the speed, higher is the viscosity and there by higher is the resistance to the movement. Furthermore, the shape of the object/body also affects viscosity. A larger or more spread out object faces greater resistance to motion in the water. The buoyancy of the water can assist and resist with the exercises of the extremities. In addition, changing the speed will either grade or change the exercise difficulty. Buoyancy of water is affected by postural alignment and the surface area immersed in the water.^[4,5]

3. CASE REPORT

Muscular dystrophy diagnosed patient aged 7 years with levoscoliosis and deformities in both upper and lower limbs, was brought to Physiotherapy department at SGS Hospital, Mysuru.

4.1 On Examination

Levoscoliotic lumbar spine, both lower limbs were deformed in hips 25 degrees and knees 35 degrees flexed remaining passive range of motion was full with pain in terminal degrees of flexion. Ankle joints were dorsiflexed and fixed, only 5 degrees of passive movement was possible. Metatarso-phalangeal and interphalangeal joints were full and free. Shoulder range of motion was 90 degrees, elbows 25 degrees flexed and wrist extension was 15 degrees on right; and 20 degrees on left hand. Shoulders passive range of motion is 110 degrees with pain and elbow flexion passive range of motion was up to 90 degrees. Wrist joints passive range of motion was full but painful. Metacarpo-phalangeal and interphalangeal joints of both hands were full and free. Joints mobility was restricted and both active and passive range of movements beyond above mention range was painful.



Figure 1

4.1.1 Past history

Patient's birth weight was 2.5 kg. Patient was not able to pull and sit. At age of 4 years, patient was evaluated and observed with delayed motor milestones, with history of inability to walk. Following tests were conducted to diagnose the condition. EDTA blood was tested by molecular method where DNA was isolated from blood by salting method. The sample was analysed by PCR-RFLP for Exon 7 and 8 in SMN1 gene (survival motor neuron). The sample did not show deletion of Exon 7 and 8 in SMN1 gene. CT brain showed no focal lesions. Microscopic findings of muscle tissue biopsy revealed fascicular architecture partly effaced, neurogenic features included hypertrophic and atrophic fibers in groups. Interstitium included part of fascia and fat infiltration. CPK levels were recorded remarkably high 1398 IU/L (54-269). Excellent age related speech and language skills were evaluated along with appropriate cognitive skills.

4.1.2 Procedures administered to the patient

To retain mobility of joints with less discomfort, hydrotherapy was opted as choice of management for this patient along with other exercises on land. As muscular dystrophy is a progressive disorder, hydrotherapy to this patient was designed once in a week along with regular exercise therapy. Since child is not mobile, all active and passive exercises were performed in baby tub considering patient's comfort. Patient had a secured feel while exercising and all movements were given under water (See Fig-1).

4. RESULTS

Patient had pain free passive and active movements while mobilizing joints for the same range of motion as done on land that were painful. Active movements by patient were also done with ease and patient being child, water play and splashing was exciting patient for exercising. The range of joints and muscle power were maintained the same during the 6 months of trial period.

5. DISCUSSION

Hydrotherapy is a form of treatment in which the physical properties of warm water are utilised to gain relaxation and freedom of movement. Hence hydrotherapy has the benefits of decreased muscle tension and pain stretching of soft tissue contractures. Along with added benefits of decreased anxiety levels, improved body awareness, increased joint range of movement, release of emotional stress, improved circulation, improved breathing pattern, less fatigue/increased energy. Hydrotherapy is useful in management of acute or chronic pain, rehabilitation for pre and post-joint replacement surgery, internally fixed fractures, relieves arthritic pain. Along with pain management hydrotherapy also improves muscle strength. Additionally, hydrotherapy is a good alternative to vigorous exercise during pregnancy, and can help with labour pains during childbirth/water birth. Halliwick Aquatic Therapy also known as Water Specific Therapy (WST) implements the concept in patient-specific aquatic therapy for application in rehabilitation of injury and disability. Warm water decreases stiffness and relieves pain, while water viscosity provides the required resistance for aerobic and strengthening exercises. Hydrotherapy should be avoided in conditions like open wounds, active infection, altered sensation, hydrophobia, heat or cold intolerance and poor balance.

In cases like muscular dystrophy which are progressively deteriorating, hydrotherapy can help maintain the muscle power and even if deteriorating, there would be less strain to the patient to continue with exercises. Patients without deformity onset should be opting hydrotherapy so that patient can walk and do other exercises in water with support or floating aid to maintain joint conditions.

6. CONCLUSION

Hydrotherapy can be choice of management in pain and musculoskeletal disorders. It helps in pain management, maintaining muscle flexibility and improves/maintain joint range of motions. Hydrotherapy sessions conducted on Muscular dystrophy patient seemed beneficial as patient enjoyed doing exercises as well as the joint mobility was maintained with less discomfort to the patient than done on land.

CONFLICTS OF INTEREST: Nil

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