Discussing about the use of water as facilitation, resistance or support in hydrotherapy

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ABSTRACT
The hydrotherapy is a physiotherapeutic resource based in the hydrodynamic that includes the flotation and the viscosity analysis. It provides that the motors activities in warm pool can be facilitated resisted or offer support to the body or its segment. In this revision it is discussed motor activities in these three situations focusing the correct posture to be used for a certain therapeutic objective besides as the aquatic equipment that can offer progression to motor activities.

KEYWORDS
physical therapy, physical exercise and hydrotherapy.

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Introduction

Hydrotherapy is a physical therapy modality that utilizes the physical, physiological and kinesiological effects caused by the immersion of the body into a heated pool, as an auxiliary rehabilitation resource or in the prevention of functional alterations.

Among the physical principles of the water on which hydrotherapy is based are fluctuation and viscosity. Fluctuation is the force experienced as an upward thrust that acts against gravity; viscosity is the result of the friction among the molecules of a liquid due to the adhesion and cohesion forces. Fluctuation and viscosity, either alone or combined, make it possible to use the water as a facilitator, resistance or support factor for body movements or one of its segments, depending on the patient’s posture, i.e., it is directly related to the body position inside the water (decubitus).

The literature concerning this topic is quite scarce, being restricted to books chapters that deal with the subject by focusing on the basics of hydrokinesiotherapy, but not discussing, in a simplistic and superficial manner, its applicability in clinical practice.

Based on the above mentioned facts, this study was conceived specifically to discuss the different possibilities of physical exercises offered by water to facilitate, resist or provide support to the segment or the whole body.

The exercises assisted or facilitated by fluctuation are those in which a certain part of the body is moving upwards, towards the water surface. These exercises promote early passive joint ranges.

The use of a fluctuator in this type of movement increases the force of traction on the soft tissues. It is important to remember that the use of fluctuators to increase the effects of fluctuation towards the water surface also increases the resistance to the downward movements, towards the pool floor. The amount of fluctuation provided can be altered by modifying the size of the fluctuator (directly proportional to the size), the amount of air in the fluctuation material or by the lever arm that is exercised on the limb.

The water offers resistance whenever is the movement direction, when the velocity of the exercise is higher than the water critical velocity, which is the effect caused by viscosity. The grading of the water resistance to motor activities is obtained by the movement velocity, water depth, lever arm, frontal area of the object, change of movement direction and density (use of fluctuators). The fluctuators demand that the patient exercises a motor force and control to thrust and/or restrain the limb through the water.

The water will offer support to a body segment when there is no muscular contraction of the limb being used at the moment when the fluctuation force is equivalent to the gravity force, making the limb or the body to stay on the water surface. It is a downward thrust that acts in an opposite direction to that of gravity. The patient’s support will be better with the use of fluctuators, proportional to the size, type and position of the used fluctuator.

Below is an example of motor activity for the upper limb, lower limb and the trunk, which discusses the patient’s position, the use of water as a facilitator, resistance or support factor, as well as the grading of the movement and examples of water equipment that can be used in each situation.

1. Lower limbs

Position: Patient standing upright, with one hand on the border of the swimming-pool, performs the movement with the contralateral lower limb.

Facilitation: without muscular contraction, the fluctuation will assist the movement directed towards the water surface. It allows ROM gain of hip abductors and extensors (Figure 1).
Resistance: to move the lower limb above its critical velocity in different directions. It allows the strengthening of the external and internal rotators, abductors and adductors, flexors and extensors of the hip, directly, and of the hamstring muscles, indirectly. (Figure 2).

Support: to keep the lower limb relaxed in hip flexion. The fluctuation will maintain the segment fluctuating and will allow the movement of the limb in abduction and adduction (Figure 3).

Progression: without fluctuator, with fluctuator, increase of fluctuator size; position of the fluctuator from proximal to distal.

Types of water equipments that can be used: ankle devices, floaters and water tube.

2. Upper limbs: with one hand on the border of the swimming-pool and performs the movement with the contralateral limb extended.

Facilitation: without muscular contraction, the fluctuation will assist the movements towards the water surface. This activity allows a ROM gain of the shoulder abductors, extensors and flexors (Figure 4).

Resistance: to move the upper limb above its critical velocity in different directions. It allows the strengthening of the shoulder external and internal abductors and adductors, flexors and extensors (Figure 5).

Support: with the limb relaxed, the fluctuation will maintain the segment in shoulder abduction or flexion. It allows muscular relaxation and segment support (Figure 6).

Progression: without fluctuator, with fluctuator, increase of the fluctuator size and position of the fluctuator from proximal to distal.

Types of water equipments that can be used: weights, hand paddles, floaters and water tube.

3. Trunk

Position: the patient changes from bipedestation posture to dorsal decubitus.
Resistance: any movement performed with the body straight, immersed in the water at a depth that can vary from the xiphoid process to the shoulders (Figure 8).

Facilitation: patient slowly bends the body backwards (the fluctuation will assist the lower limbs towards the water surface) (Figure 7).

Support: with the body relaxed in dorsal or ventral decubitus, fluctuation will support the whole body (Figure 9).

Progression: without fluctuator, with fluctuator, increase of fluctuator size and position of the fluctuator from proximal to distal.

Types of water equipment that can be used: ankle devices (lower limbs); weights and hand paddles (upper limbs) and board, cervical
collar, pelvic collar and water tube (trunk).

**Conclusion**

The comprehension of the movement inside the water and the difference when it is compared to movement on the ground is essential for the planning of the hydrotherapy.

The water can be used to facilitate, resist or support a movement. The change of decubitus to perform a certain exercise can compromise the therapeutic objective. The water assists movements directed at the surface (used to increase joint range of motion), resists any movement performed above its critical velocity (used for muscular strengthening) and supports the limb as long as it is free of muscular contraction on the water surface.

We conclude that the physical therapist must understand and utilize the interaction of these forces in the water and it is necessary to be careful when choosing the decubitus and the equipment to be used, in consideration of the therapeutic objective to be achieved.

**References**