



## APPLICATIONS OF BAD RAGAZ METHOD IN AQUATIC PROGRAMS OF REHABILITATION

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### Abstract

*Bad Ragaz method is a set of aquatic therapy techniques developed over time in thermal waters Bad Ragaz in Switzerland. This evolving method is used for rehabilitation and strengthening muscles to relax, lengthening the spine traction and increased tone, increased range of motion, muscle strengthening legs for wearing body weight, increase overall body strength.*

*The exceptional properties of water buoyancy, turbulence, pressure springs are used to facilitate the recovery process through a program of relaxation exercises and progressive stabilization.*

*People with paralysis and functional limitations of the segments easily supports limits the scope of movement in water, in particular by reducing pain.*

*Exercises performed with the therapist and materials floating in the neck, arms, torso and legs (knees and ankles), horizontally are used to practice in a safe, supportive benefiting from the psychological effects of hot water in -a closed kinetic chain exercises complex.*

*The techniques used by the therapists in Bad Ragaz method are isokinetical procedure, isotonical and isometrical.*

*The exercises are structured on patterns movement of torso, arms and legs, the movements are unilateral or bilateral, symmetrical or asymmetrical.*

*Adaptability and flexibility techniques practice models can be a variety of exercises to be used to maximize the needs of each physical conditions.*

**Keywords:** *herapy, aquatic applications*

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### Introduction

The exercises in Bad Ragaz method can be divided into separate models of working legs, trunk and arms. Models can also be classified as unilateral or bilateral models. The models have options bilateral symmetrical and asymmetrical. All models are applied in moving back floating position.

Bad Ragaz Method is a concept of active aquatic physical therapy done on an individual basis, the therapist and the patient. The therapist specializing in learning the art handling pacients, aims to support patients in a horizontal position in water.

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Progression of practice is achieved by harnessing hydrodynamic forces of water. Moves faster through water creates greater braking due to turbulent flow, which causes self-regulation resistance, depending on the patient's abilities. Resistance exercises adapt to the capabilities of the individual. The device resistance, such as mittens may be used to increase the resistance to motion. Concentration exercises directly on the affected area is not recommended, especially in chronic pain. Executed properly, exercises with distal parts of the body produce radiation in affected areas.

Progression of exercises can be performed by:

1. movement in widely gradually motion,
2. changing from proximal to distal outlets,
3. to increase the speed of movement,
4. changing body shape to lengthen the lever,
5. introduce techniques such as isotonic contractions combinations or repeated contractions,
6. increasing resistance using resistive mittens or other equipment,
7. the use of less of the floating rings (so that the patient is in deeper water)
8. change the front surface.

The waters of Bad Ragaz, Switzerland have a long history, being discovered in 1240 near the town Pfafers where baths were excavated in the rock in a narrow gorge, used as a cure for physical and mental diseases. As a result of increasing interest to develop a health spa maintenance in 1840 these thermal waters were directed to the town of Bad Ragaz. The benefits of these waters began to appear:

- in treating locomotor deficiencies;
- was introduced technique of floating material, neck, pelvis and ankles, by which to get water moving through the patient by the therapist;
- oriented approach is used for stabilization and consolidation exercises, which can address various conditions imposed by the resistance manually with passive movements, active with active assistance and resistive;
- proprioceptive neuromuscular facilitation technique (Knott and Voss, 1968), used by therapists in Europe included a three-dimensional movements, each model can be modified and adapted to a wide variety of orthopedic or neurological diagnoses;
- „during the implementation of original concepts, models most commonly used Bad Ragaz allow better control and plug the therapist's hands, emphasizing the ability to facilitate or inhibit a response” (P. G. Atkinson, R. A. Harrison, 1981);
- there is a range of models based on direct approach between therapist and patient, grouped into three categories: lower extremity, trunk and upper extremity;
- applied techniques constitute the passive models that require no active participation of the patient and imposed, requiring the patient to have intact cognitive skills in order to perform adequately patterns indicated.



Biomechanical knowledge, provides the fundamental basis of hydrodynamic and neuropsychological important for resistive therapy method Bad Ragaz. „When a motion properties into a joint such as direction, intensity and speed influences the neighboring joints, the movement continues to grow” (M. R. Campion, 2000). Every continues move changes the balance, forcing the body to react to find a stable equilibrium position. These reactions occur in two stages:

- stops by a counter action continuous movement, which is called active counterweight (or thrust),
- using one side or both sides, symmetrical or asymmetrical movements as a counterweight to limit the effects of continuous motion - activated passive counterforce.

Bad Ragaz method is used in both counter-force, active and passive movements. In terms of physiological practicing only active counter forces are important. Knowledge and proper activation of these counter-forces are of the highest importance on the proper use patterns Method Bad Ragaz. For example, when using a model reciprocal unilateral center of gravity moves the center line, causing the rolling body. To prevent this, it must followed exactly the counter activities. Movements that occur as a counterforce passive activities have a high therapeutic value because they are automatic movements, reactive patient can be aware. These automatic movements occur with low force, appear slowly and can be easily controlled by the therapist.

When a water body is in the free-wheel experiences on a side of the body or to an extremity and there is a force that moves the body towards the thrust. The different mechanical forces supporting the movement of water, giving the body a general mobilization in a certain direction. Before starting to move the body, must overcome inertia. When you start moving, the body gradually increases speed, creating a turbulent flow behind, increasing friction. In addition, the viscosity increases due to water pressure front. The forces of friction in the water depends on the relationship between the density and viscosity differences between water and air. Otherwise, the difference between air and water is 1:14. Therefore, friction or resistance to movement is 14 times higher in water than in air. In addition, increase the resistance movement faster because of turbulent flow. Bad Ragaz method uses these mechanical forces like fluid resistance. For this reason, the patient should always floats on the surface of the water during this method of treatment.

### **Proprioceptive neuromuscular facilitation**

The history of the Bad Ragaz method highlights various therapeutic concepts underlying its origin. But because the method Bad Ragaz is regarded as „proprioceptive neuromuscular facilitation in the water”, a comparison of concepts is important. Proprioceptive neuromuscular facilitation is defined as a method of promoting or speed up the response mechanism proprioceptive neuromuscular stimulation (M. R. Campion, 2000). It is a particular collection of techniques that promote a response from the neuromuscular system by stimulating proprioception.



The patient always uses resistance therapist as a fixed base support such balance is guaranteed more or less continuously. Resistance therapist is continuous movement throughout execution.

Also, when the body is floating in water, it is in stable equilibrium. One small move, however, can change the relationship between the center of gravity and center of buoyancy and causes loss of stable position. The balance can be restored in Bad Ragaz method in two ways: using a stabilizing support (flotation material) and the therapist, whose hands are the only real points of mobilization. For a stationary body floating freely without aid, it is impossible to stretch reflex. Therefore, unlike the proprioceptive neuromuscular facilitation, stretch reflex can not be used to initiate a movement in the water. Effects of Bad Ragaz resistance method exists because the therapist's hands and friction created by movement through the water. This balance makes it impossible subtle movement at end of movement in all models. Frequently, only part of proprioceptive neuromuscular stimulation patterns are used in the method Bad Ragaz.

### **Methodology**

Bad Ragaz method is a model of resistive exercises to strengthen and mobilize possessing a variety of features excellent recovery:

- Present a specific therapeutic regimen, with well-defined indications,
- Is used therapeutically, but it is used for general water fitness,
- Is an ideal part of comprehensive treatment concept in aquatic therapy,
- Analyzing functional therapeutic targets and functional limitations of the patient and then choose the most suitable models,
- Represents a base for improving strength, mobility, stability or body functions,
- In rheumatology, orthopedic and neurological diseases, such as rheumatoid arthritis, osteoarthritis, chronic inflammatory problems and deficiencies of the spine, or in post-operative,
- In general, therapeutic models focus directly on the functional problem, being used in a later stage, initially, the effects are created indirectly as a side effect (such as stimulation of mutual bilateral models of the foot).

Activities are economical, efficient and maximizes patient skills.

Bad Ragaz method is not just a consolidation technique but a complete concept physiotherapy treatment, which can be focused on modulation of pain and muscle relaxation. To achieve this goal, specific techniques are used.

### **The objectives of the treatment methods**

There is a leaderboard with descriptions of health problems into four components, which are widely used in rehabilitation (World Health Organization). These four components are connected to each other, though an increase to a level not necessarily lead to an increase to the next level. For example, improvements in the level of function, not automatically lead to changes in activity and participation levels. The advantage of this classification is that the patient's treatment goals can



be defined properly.

The levels are:

- ~body structure,
- ~body functions,
- ~activity,
- ~participation.

All Bad Ragaz objectives method can be found in the structure and functioning of the body and can be addressed separately or in combination:

- Improving strength,
- Enhanced coordination,
- Increased joint stability,
- Range of motion increased,
- Local high-resistance,
- Lower extremity ability to wear body weight,
- Reduction of pain.

Objectives are used for patients with neurological, orthopedic and rheumatologic and serve as preparation for therapy in activity levels or participation.

„When the lens is focused on neuromuscular re-education, the principle applied stretch reflex can be integrated to enhance contractile properties and power in one muscle or muscle groups” (Stein., J. U., 2002).

Water depth recommended for the effective implementation of the method is between 0.9 - 1.2 m. The water level should remain between the vertebrae T8 - T11 of the therapist because a higher water level would lead to the loss of stability and a greater effort made to eliminate the effects of buoyancy.

## **Discussion**

### **Applying techniques**

Applying this method involves techniques appropriate qualifications and, therefore, the therapist must have accurate knowledge of the concept and fine manipulation technique as it involves certain requirements:

~ Is more than work against the resistance of water and requires knowing when to add a fixed to a floating patient dorsal rings support the requirement movements active in straight,

~ Therapist should evaluate the patient to determine intervention needs and then choose appropriate models and parameters. Physiological parameters differ depending on the therapeutic target, such as increasing mobility, strength or power.

The therapist must know the strength parameters in patient applications. The patient must be advised of the following procedure. When necessary, the adjustment of mind occurs, which must precede the techniques applied. This mental preparation is an important component of the treatment program in applying Bad Ragaz. If the patient does not feel comfortable in a position or have difficulty breathing control, balance or stiffness, will interfere with treatment.

The program involves teaching aids buoyancy existence, providing patient



safety and stability in water. These flotation devices also slow rotation of the body. Neck and hips are supported by rings filled with air and, depending on the year, a third ring can support one or both ankles.

Positioning and grade inflation flotation aids are quite specific, must be placed so that the movement should not be restricted. Rings around the ankles should be extremely limited amount of air. When too swollen body becomes unstable and the water is too high.

Ring hips should support center of gravity S2, not the waist. A collar around the neck facilitates neutral alignment of the spine and allow the patient to hear the therapist's instructions. In addition, some models cervical collar serve to create a counter-push. The therapist is the point fixed for the patient during exercise programs Method Bad Ragaz. Therefore, the therapist must be in stable equilibrium, avoiding excessive movements. Therefore, the water depth for the therapist should be maximum at the ninth thoracic vertebrae; deeper water significantly decreases body stability.

Muscle activity caused by the method Bad Ragaz include variables and isometric contractions. The type of variable contraction is commonly referred to as isotonic or isokinetic. This type of contract is used when the external resistance therapist vary to match the force produced by the patient. This technique allows for maximum force in any angle of articulation. Muscle tension adjusts depending on the length and changes in speed of movement and its external lever. This is how the dynamic models of the method Bad Ragaz (M A. Boyle, 1981). Specific treatment techniques used during the method Bad Ragaz, isotonic muscle contraction can be divided into concentric isotonic contractions and isotonic eccentric contractions. These techniques are derived from proprioceptive neuromuscular techniques facility. Due to the influences of fluid mechanics, only part of the treatment techniques used in neuromuscular facilitation method can be integrated in Bad Ragaz (table gives an overview).

The second type of muscular contraction is isometric contraction. In this situation, the patient maintains a certain position during maneuvers of the journey by water therapist. Hydrodynamic forces offer resistance. The patient can get to keep a particular position in a body part while another part moves. Specifically, models of mutual bilateral asymmetric feet, one foot stabilizes the body in an isometric contraction and the other moves isotonic.

Before you actually start the treatment method Bad Ragaz, a short session passive motion should be made to relax, tone regulation and spine traction. This activity is ideal preparation for the formation of specific resistance by this method. The relaxation during the practice patterns can be achieved by the inclusion of neurophysiological phenomena of mutual inhibition.

"Based on the principle of combining means prophylactic and therapeutic in some complex treatments we can associate to public health, hygiene, diets, physical agents natural (air, water, sun) and artificial means and methods of therapeutic and other factors that strengthen and increase their specific means of action." (Dominteanu, T., 2010).



## Methods

### PERIOD OF RESTORATION

Meetings recovery in Bad Ragaz method of treatment depend on the objectives. The minimum time should not be shorter than 15 minutes, particularly for patients with significant shortcomings. The exercises are designed to strengthen these patients and should not exceed a few minutes each time, because fatigue occurs rapidly at high load (less than 80% of one repetition maximum intensity).

The period of rest after each set of exercises should be 1.30 - 3 minutes when using contractions with large loads. A second set can be applied to the same group of muscles, but decreasing procedure called inverted pyramid.

Longer periods are necessary treatment to increase the level of aerobic endurance. By Method Bad Ragaz, local muscle endurance can also be enlarged in a meeting of more than 30 minutes. Muscle contractions in the series should not exceed 20 submaximal contractions, with a break of 1 minute between sets. In this break can prepare other muscle groups while previous request muscles relax.

"To obtain prophylactic and therapeutic effects develops complex shapes and special methods of medical gymnastics, determined by the characteristics of disease groups or individual clinical needs." (Dominteanu, T., 2008).

### *Treatment techniques in proprioceptive neuromuscular stimulation through the method Bad Ragaz*

<b>Treatment techniques</b>	<b>General presentation</b>
Rhythmic initiation	The therapist begins with passive model and helps the patient gradually. Finally, the patient moves to a model.
Reversing the antagonist muscles	The change from one model to the opposite without pause and without relaxation between models.
Repeated contractions or stretch	Repeat the extent of the area of movement is holding pattern, stretch muscles and increases active contraction.
The combination of isotonic exercises	Combine movement isotonic concentric isotonic eccentric work. No relaxation occurs between different types of muscular activity.
Emphasis on distribution movement	It changes the normal distribution with distribution of motion applied to other joints. Stabilizes joints strong and transitioning weaknesses.
Maintaining relaxing	It brings the body into the desired position and gradually raise the resistance without any movement. Maintain position.
Contraction-relaxing	It brings the body into a position and shoot in a desired direction. It resists movement.



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