



## Dilemmas in the Application of Hydrotherapy and Balneotherapy

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Hydrotherapy (Greek. Hydro - water, terapeia - treatment) means the use of water to heal. The water was used in different aggregation conditions such as: liquid, solid or in the form of steam. Throughout history, even in prehistoric times, healing and recovery were related to the use of thermal waters, swimming and using climate benefits. The physical properties of water used in hydrotherapy are: buoyancy, hydrostatic pressure and water density [1].

The force of the buoyancy is interpreted by Archimedes' law, which reads: the body immersed in the liquid (water) loses apparent weight as much as the heavy volume of liquid spills. This allows us to perform an active movement with much less muscular power than carrying out the same movement out of the water. The exercises performed in water are exercise with reduced muscle load [2].

Hydrotherapy has a very positive effect on the musculoskeletal system, but also on other systems (cardiovascular, respiratory, renal, endocrine, etc.).

Water as a therapeutic medium is of particular importance for the implementation of medical gymnastics (hydrogymnastics). Exercises can be performed in the pool or in specially designed butterfly tubs (Habbard baths). In the pool, as a rule, group exercises are conducted. The Habbard baths with their specific construction allow access to patients from all sides. They are applied for performing individual exercises [3].

Using the before mentioned physical properties of water, it is possible to increase exercise volume and muscle gain by exercising in the water. The exercises performed in water are exercise with reduced muscle load. But muscle load can be increased

by performing a movement in a certain way, eg walking in the water to the chest level is a good exercise to strengthen the thigh muscles. Otherwise, exercise in deep water requires the activation of muscles to control posture and balance maintenance [4]. The combined action of lifting force and hydrostatic pressure help with balance exercises in a standing position. Hydrostatic pressure ensures uniform support throughout the body [5]. If the patient has difficulty maintaining the balance and stumbled, the buoyancy force helps him to re-verticalize. Pool exercises last for 15 to 30 minutes with possibly another 20 minutes of swimming. It is not advisable to keep it in hot pools for longer than 1 hour. In addition to running water, pools or baths can use thermal water or sea water [6].

Contraindications for hydrotherapy are uncontrolled cardiovascular diseases (eg poorly regulated hypertension, extrasystolic disease, cardiac decompensation), neurological diseases with loss of consciousness (eg epilepsy), urogenital infections, incontinence, skin diseases (eg fungal diseases, psoriasis, varicose veins syndrome, etc.) [7].

Balneotherapy (Latin balneum - bath and Greek terapeia - treatment) is treatment by using mineral water. Mineral waters are water containing more than 1 g/L of dissolved solids or have a temperature of more than 20 degrees C, or, however, contain small amounts of strong physiological activity. Also referred to as healing mineral waters [8].

The name comes from the Latin word balneum, meaning bath. Recently, SPA therapy has been reported more frequently (Latin Salus Per Aquam, Sanitas Per Aquam, SPA). Apart from the fact that water from natural thermal mineral springs has healing properties, balneotherapy combines with medical exercises to increase the

volume of movement, muscle strength, muscle spasm reduction and pain reduction. Usually the water temperature is about 34°C, for about 20 minutes.

Balneotherapy is a complex therapeutic discipline that uses natural factors to treat. It includes factors such as mineral water, medicinal gases, peloids, climate, change of environment, a dietary regimen, active and passive psychophysical rest. Numerous clinical studies have demonstrated the beneficial effects of balneotherapy in degenerative rheumatic diseases. Significantly improved physical and mental components of quality of life, anxiety, depression, pain duration, pain intensity and functional abilities were observed. Therapeutic effects are maintained even after five months, both in clinical and laboratory parameters [7,9].

Balneotherapy combined with modern medication treatment and physical medicine and rehabilitation methods contributes to the overall favorable outcome of all forms of rheumatic diseases. The effects of balneotherapy are based on the mechanical and thermal influence of the balneo factor, and they depend on chemical and mineral composition of the components, their absorption, and biological effects that are tested in many randomized, controlled studies. Well-documented effects such as vasodilation, increased pulse volume, stimulation of the metabolism and the immune system are well documented. The use of balneotherapy causes significant variations of endorphins, cortisol and ACTH, increased insulin growth factor 1, tumor necrosis factor alpha deficiency, reduction of serum levels of nitrogen oxides and metalloproteinases [10].

The use of mineral water comes from prehistoric times and continues to be transmitted from Celtic, ancient Greeks and Romans to the present day. Hippocrates (460 - 377 BC) critically looked at the use of mineral waters. Galen (129<sup>th</sup> to 199<sup>th</sup>) for the use of mineral water has no comment. Significantly greater importance was given to balneotherapy in the Middle Ages, in Padua. Other professions and better knowledge of balneology in the twentieth century did not feel good about its development [3].

Balneotherapy differs in terms of bathing, drinking mineral water, inhalation or peloid. Baths are used in a bathtub where the patient is lying quietly. According to the bath temperature, they are divided into indifferent and hyperthermal. Indirect baths have a temperature of 34 to 36 degrees C with a small thermal effect, but with more pronounced other effects (eg metabolic). Hyperthermal

baths have temperatures 40 to 42 degrees C with more pronounced thermal bath. The duration of the bath is 15 to 30 minutes. It can be partial when taken to one part of the body and saves the rest. The temperature in that part of the partial bath may be 45 degrees C [11].

Common baths in swimming pools can be applied where the temperature is 30 to 40 degrees C. They are used for those patients who need to achieve increased mobility of the joints.

Balneotherapy has a complex effect. Besides the effects of thermal mineral water, it includes microclimate of the area where the treatment is carried out, on diet, lifestyle and the release of psychological stress, and these factors have an extremely beneficial effect [12].

Physical activity is essential and dominant. Baths in thermal mineral water have a thermal effect, they act on hydrostatic pressure, water resistance, and buoyancy. The other is chemical action. In thermal mineral water there are minerals (ions) that act on the human body in the sense of causing hyperemia, pain reduction, swelling decrease and improving function. The bath lasts for 30 minutes. After bath, the patient is lying on the lounge, well covered and wrapped. Bathing treatments last about three weeks.

Drinking mineral water can be an integral part of this therapy. The water is drinkable in the morning and before meals. The daily amount is 1 to 1,5 L of mineral water. The dosage is individual and depends on the content, the thermal water drink on an empty stomach, and at times the cold weathers are sometimes heated.

Balneotherapy is combined together with various forms of physical therapy. Kinesiotherapy, hydrotherapy, electrotherapy and other procedures have a central place in treatment and rehabilitation in today's special rehabilitation hospitals.

Therefore, thermomineral water is predominantly used in hydrotherapy for rehabilitation of patients with locomotor system lesions. It is carried out as hydrotherapy in the pool or in the tubs with thermomineral water.

### Types of healing waters

There are several types of healing waters. These are sulfuric, salty, marine, radioactive, iodine baths, carbon dioxide baths, juvenile, wild and fossil water and acaroterms.

1. Sulfur bath acts on skin capillaries, stimulating the skin and regulating metabolism. Sulfur baths have the advantage of treating rheumatic diseases, especially degenerative.
2. The salt bath is similar to seawater. It works on the whole body, improves the condition, acts sedatively and reduces the painful state. The contraindications are edema and febrile conditions.
3. Sea bath contains a number of elements that favorably effect the human organism.
4. Radioactive bath contains radon. It is used by inhalation and bath in chronic rheumatic and neurological diseases. It acts as stimulant to the body, it reduces the pain and suits the airways through inhalation.
5. The iodine bath has an effect on blood vessel diseases.
6. The carbon dioxide bath is indicated for heart disease and vascular disease. Carbon dioxide exacerbates the endothelial thermoreceptors in the skin, causing vasodilation and changes in metabolic processes. They are contraindicated in cerebrovascular insults, coronary insufficiency, high blood pressure, and so on.
7. Juvenile water comes from muddy magma located in the interior of the earth under high pressure. Excessive water vapor exits through the permeable and impermeable layers on the surface of the earth. By passing over the layers, it cools down and obtains mineralization from various layers. It is characterized by constant temperature, constant capacity and constant chemical composition.
8. Fossil water also called oil waters. They are found in subterranean pebble and sandy layers. Such waters come with drilling, and their amount is limited. They are located where they were once a sea and often accompanied by oil foundations. They are referred to as oil because they contain oil and fossil fuels because they contain fossils of marine organisms.
9. Vaporous water is a subterranean water, which is held in the airborne belt just below the Earth's surface. They originate from rainwater that falls into underground impermeable layers and can contain different, variable amounts of minerals. Their quantity is not constant and depends on the amount of rainwater.

The treatment is indicated with regard to the composition of thermomineral water, in various diseases: rheumatic diseases, including degenerative diseases of the joints (arthrosis, coxarthrosis) and spine (painful spinal syndromes), inflammatory rheumatic diseases (except acute and active phase) and extra-articular (severe forms with contracture), neurological diseases, blood vessel diseases, cardiovascular diseases, particularly in carbon dioxide baths, metabolic diseases [1,2].

Contraindications for the treatment include: acute and active rheumatoid arthritis, uric arthritis, non-specific and specific arthritis, malignant diseases, diseases indicating bleeding tenderness, skin diseases (except psoriasis), severe heart disease, blood vessel disease, high fatigue, acute psychosis, infectious diseases, age [1,3].

### Balneological reaction

Balneological reaction is a phenomenon that occurs in the treatment of thermal mineral waters from 3rd to 6th days in baths. This reaction is characterized by tiredness, insomnia, worsening of rheumatic problems and symptoms, skin rash, depression, and sometimes high temperature. It is therefore necessary to familiarize users with therapy, correct or discontinue treatment [12].

The stimulating effect of balneological factors can be specific and non-specific. Specific effect is conditioned by specific elements and biologically active substances in mineral waters, depending on the chemical and physical properties of the mineral water used. Non-specific effect implies a change of environment, active and passive psychophysical rest and climate factors, as well as other conditions that are present in the bath [11,12].

The goal of both a specific and non-specific effect is the normalization of the defective reactivity of the organism. Other basic ingredients can be added as needed, such as: kinesiotherapy, medications, physical therapy.

Balneotherapy represents complex irritation of the patient by natural factors. The organism's response is a reactive process that manifests itself in phases. This process does not end on the effector device, but extends and lasts further after the end of the action of a natural factor, with successively involving certain functional systems, to the cellular and molecular level [5]. This reaction may be positive and negative, depending on the relationship between

the reactive ability of the organism on one and the physical and chemical properties and the dose of the applied natural factor. The essence of the problem in the action of natural factors lies in finding an adequate relationship between the dose of natural factors and the general reactivity of the organism. This implies the necessity of defining the concept of balneotherapy. Balneotherapy dose is determined by the following factors: intensity of irritation (bath temperature, intensity of the mechanical action and concentration of water-soluble mineral elements), duration of procedure (cold bath for several minutes, while the hot bath interval is highly variable and ranges from 15 to 60 minutes ) and the surface of the body (depending mainly on the condition of the cardiovascular system, which may be used partially, involving one or more extremities or baths that encompass the entire body).

### Conclusion

Experience has been known for the positive effects of hydrotherapy and balneotherapy. It is also known that the chemical composition of some water has a positive effect on a variety of functions of the organism, organic systems and especially on some of the diseases. We found that aquatic exercise effect on pain relief and related outcome measurements for locomotor diseases. However, the long-term effectiveness of these treatments remains unclear. This form of therapy can prevent the possibility of causing some illnesses, but also influences a better subjective sense of quality of life.

Because there was insufficient evidence due to the poor methodological quality of balneotherapy studies, we are unable offer any conclusions about the effects of this intervention. So there is a dilemma how, when and how to apply this therapy as well as surely valorize the positive effects that would be a task for the future.

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