

*Aktuelne teme/
Current topics*

OXIDATIVE STRESS, BALNEOTHERAPY
AND OSTEOARTHRITIS

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OKSIDATIVNI STRES, BALNEOTERAPIJA I
OSTEOARTRITIS

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Key words

balneotherapy, osteoarthritis, oxidative
stress

Ključne reči

Balneoterapija, osteoartritis, oksidativni
stres

Abstract

One of the most common joint diseases of the elderly is known as osteoarthritis (OA).

In fact, it is as old as mankind. Gonarthrosis, the most common form of arthritis, is seen not only in human population, but nearly in all vertebrates and even in dinosaurs. It is unavoidable illness.

Osteoarthritis is not a systemic disease. It does not simultaneously and equally affect all the joints in the body, but only one or eventually several of them.

In patophysiological state such as OA, chondrocytes produced abnormal amount of reactive oxygen species (ROS), nitric oxide (NO) and others, finally creating oxidative stress. If ROS production originating either endogenous or exogenous sources exceeds antioxidant defense systems capacity, oxidative stress causes the degradation of cellular membranes, proteoglycans, collagens and nucleic acids.

Osteoarthritis is an incurable disease, at least, to this day, and none can alter its progression with certainty. A number of therapies that can relieve symptoms, improve general psychophysiological patient's state as well as delay, or prevent invalidism are available.

Balneotherapy is one of the oldest and most natural forms of OA therapy. Side effects of balneotherapy are insignificant in relation to drug therapy.

A lot of studies reported that balneotherapy, especially with sulphurous water, can reduce the oxidative stress, relieve the pain, increase the mobility of joints, and improve quality of life of patients with OA.

OSTEOARTHRITIS

One of the most common joint diseases of the elderly is known as osteoarthritis (OA).

In fact, it is as old as mankind. Gonarthrosis, the most common form of arthritis, is seen not only in human population, but nearly in all vertebrates and even in dinosaurs. It is unavoidable illness.

In spite of this, the aetiology and exact mechanism of OA initiation and development are still not fully understood.

OA is a major cause of disability and is among the most frequent forms of musculoskeletal disorders. OA is a chronic, progressive, degenerative joint disease involving all joint structures: joint capsule, synovium, articular cartilage, and bone. The most affected joints by OA are the hip, spine, and knee. It can also occur in the wrist, elbow, shoulder, and jaw, but rarely.

Osteoarthritis is not a systemic disease. It does not simultaneously and equally affect all the joints in the body, but only one or eventually several of them.

It appears that OA is, in part, the vertebrates' damnation, including homo sapiens, originating from anatomical structure of the joints and also "wear and tear" on a joint. Indeed, according to general agreement, the main risk factors for OA are genetic predisposition, age, trauma, gender, and oxidative stress. Of course, there are other causes such as obesity, occupation, as well as congenital and developmental disorder, and so on. (1,5,7)

OXIDATIVE STRESS

It has been known that even under physiological circumstances chondrocytes are living in hypoxic conditions (avascular environment) let alone in patophysiological one. But for their metabolic functions, oxygen supply is necessary. Chondrocytes are supplied with oxygen indirectly from synovial fluid and then with partial pressure of oxygen (pO₂) fluctuates. For this reason, they are adapted, to some extent, to hypoxic conditions. However, in patophysiological state such as OA, chondrocytes produced abnormal amount of reactive oxygen species (ROS), nitric oxide

(NO) and others, finally creating oxidative stress. If ROS production originating either endogenous or exogenous sources exceeds antioxidant defense systems capacity, oxidative stress causes the degradation of cellular membranes, proteoglycans, collagens and nucleic acids.

Besides, ROS do not always have detrimental effects and may play role as integral factor or intracellular signaling mechanism.^(1,3,4)

General symptoms

Generally, the most common symptoms of OA, in any joint, are pain and stiffness, and in some cases spasm.

Differences. Osteoarthritis is distinguished from other forms of arthritic disorders by certain features as following:

- Osteoarthritis mainly occurs in older population
- It is located in only one or a few joints on the same side of the body
- The joints are less inflamed than in other arthritic conditions
- The pain occurs on the same side of the body
- The progression of pain is usually gradual

Treatment of OA

Unfortunately, osteoarthritis is an incurable disease, at least, to this day, and none can alter its progression with certainty. Nevertheless, a number of therapies that can relieve symptoms, improve general psychophysiological patient's state as well as delay, or prevent invalidism are available.

All therapeutic approaches and methods can be divided into two great parts: pharmaceutical and non-pharmaceutical.

Pharmaceutical therapy

Pharmaceutical therapy includes drugs, such as salicylates, NSAIDs, narcotic analgetics, Glucosamine, Chondroitin sulfate, intra-articular glucocorticoids, low-molecular-weight HA (Orthovisc, Hyalgan), etc.

Standard non-pharmaceutical treatments include patient education, self management programs, weight loss, as well as hydrotherapy, thalassotherapy, balneotherapy, chrenotherapy, climatology and wellness spa industry. Surgical therapy includes arthroscopy and joint replacement.

Non-pharmaceutical therapy

Balneotherapy is one of the oldest and most natural forms of OA therapy. Side effects of balneotherapy are insignificant in relation to drug therapy.⁽⁶⁾

Balneotherapy has been practiced for centuries in the management of all types of arthritis in many European countries. Sulfur-rich water combined with mud packs is superior in the treatment of patients with osteoarthritis of the hip, knee and lumbar spine. Two or three weeks' treatment resulted in a statistically significant improvement that lasted up to 6 months. The beneficial effects of spa therapy, based on mechanical, thermal, and chemical properties of the mineral water, on patients suffering from arthritis are not fully understood. However, some important evidence made the mechanisms be a little clearer. First of all, spa therapy has lipid-lowering effects decreasing total cholesterol, HDL cholesterol and LDL cholesterol. Furthermore, balneotherapy significantly increased plasma erythropoietin, heat-shock proteins which have cell-protective influence, reduced plasma homocystein level that is a risk factor for cardiovascular diseases as well as influences on the soluble interleukin-2 receptor level in RA. Taken all this together with sulfur interaction during spa treatment, it opens a new field of balneotherapy-prevention of arthritic disease, including OA, and wellness spa industry.⁽⁸⁾

A lot of studies reported that balneotherapy, especially with sulphurous water, can reduce the oxidative stress, relieve the pain, increase the mobility of joints, and improve quality of life of patients with OA.^(1,2,3,4)

CONCLUSION

So, we must think about prevention of the OA. The best solution could be using complex treatments in spa rehabilitation centers, where balneotherapy is combined with exercise, hydrotherapy, physical and rehabilitation medicine, diet and rest.



Apstrakt

Jedna od najpoznatijih bolesti u starijoj populaciji je osteoartritis (OA).

Stara je koliko i čovečanstvo. Gonartroza, najčešća forma artritisa, nije zastupljena samo u ljudskoj populaciji, već skoro kod svih kičmenjaka, čak i kod dinosaurus. To je neizbežna bolest.

Osteoartritis nije sistemska bolest. Ne zahvata istovremeno i podjednako sve zglobove već samo jedan ili nekoliko njih.

U patofiziološkim stanjima kao što je OA, hondrociti proizvode abnormalne količine slobodnih radikala kiseonika (ROS), azot oksida (NO) i drugih, stvarajući tako oksidativni stres. Ako produkcija ROS stvorena bilo endogenim ili egzogenim izvorima prevazilazi antioksidantnu odbranu, oksidativni stres uzrokuje degradaciju ćelijske membrane, proteoglikana, kolagena i nukleinske kiseline.

Osteoartritis je neizlečiva bolest, bar do danas, i niko ne može promeniti njenu progresiju sa sigurnošću. Brojne terapijske procedure mogu ublažiti simptome, poboljšati opšte stanje pacijenta, ili sprečiti nastanak invaliditeta.

Balneoterapija je jedna od najtarijih i najprirodnijih načina lečenja OA. Sporedni efekti balneoterapije su beznačajni u odnosu na lekove.

Mnoge studije potvrđuju da balneoterapija, naročito sa sumporovitom vodom, može ublažiti oksidativni stres, ublažiti bol, povećati mobilnost zglobova, poboljšati kvalitet života pacijenata sa OA.

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