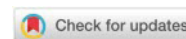


# MUD THERAPY – A NATURAL CHONDROPROTECTION OF JOINT CARTILAGE

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**Abstract:** Osteoarthritis is a joint disease in which there is degeneration and destruction of the articular cartilage with subsequent formation of osteophytes and changes in the joint capsule. It is a disease that affects all structures of the joint and the surrounding tissues (muscles, tendons, ligaments).

Interest in non-medicinal and non-surgical methods for the prevention and treatment of osteoarthritis is growing strongly. Here, the methods of physical and rehabilitative medicine and mud therapy come into consideration above all.

Liman mud has pronounced anti-inflammatory, pain-relieving and immune-stimulating properties, improves blood circulation and activates the metabolism. It has a positive effect on metabolism and tissue nutrition and promotes tissue regeneration. The healing mud interacts in a complex way with thermal, chemical, mechanical, electrodynamic, biological and other factors. The thermal and chemical factors are of particular importance for the healing results.

**Keywords:** osteoarthritis, mud therapy, chondroprotection, estuarine mud, alternative methods of treatment  
Field: Medical sciences and Health

## Introduction

Mud is a natural product formed under natural conditions from soil particles, organic and inorganic compounds by chemical, biological and microbiological processes. It is known as peloid (from the ancient Greek pelos - mud).

It has strong anti-inflammatory, analgesic, and immune-stimulating properties, as well as the ability to improve blood circulation, activate metabolism, and strengthen the bone system. The positive influence of the healing mud on metabolism and tissue nutrition promotes tissue regeneration.

Mud therapy has been known for thousands of years. One of the first records of it dates to the time of the ancient Egyptians who lived on the Nile and used the healing mud to relieve their joint pain. The Romans also knew about the properties of this unique natural product, and special pools with sea mud were created for the imperial soldiers, where they recovered after hard battles and treated their wounds. Mud from the estuaries of the sea is considered to have special healing powers because it contains a large number of trace elements. In Europe, mud healing became very popular around the 17th century. In Bulgaria, the method was first used in 1905 by Prof. Dr Paraskev Stoyanov in the marine sanatorium of Varna.

Mud formation is a slow process, with about 1 millimetre of healing mud formed in a year. Mature estuarine mud is thick, of creamy, homogeneous consistency and black in colour. It contains iron hydrosulphide and hydrogen sulphide, which determines its characteristic odour. It has a high thermal conductivity.

The specific effect of estuarine mud is determined by its composition - sulphur and humic acids inhibit hyaluronidase and stimulate the formation of cytokines, which determines its chondroprotective and anti-inflammatory effect.

## Discussion

Osteoarthritis is a joint disease in which there is degeneration and destruction of the articular cartilage with subsequent formation of osteophytes and changes in the joint capsule. It is a disease that affects all structures of the joint and surrounding tissues (muscles, tendons, ligaments, etc.))(Simona Bellometti 1997).

The main symptoms of osteoarthritis are pain and stiffness in the affected joints, and in some cases, there may be swelling and grinding when moving the joint.

There are several types of treatment for osteoarthritis:

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- Medication - anti-inflammatory and analgesic drugs (e.g. paracetamol, diclofenac, ibuprofen, opiates, etc.), intra-articular injection of hyaluronic acid, chondroprotectors or corticosteroids into the affected joints, local application of NSAIDs.

- Physiotherapy and balneotherapy

- Lifestyle changes - weight loss, physical activity.

- Surgical methods (joint replacement) - necessary in cases where all the treatment methods described above are ineffective or the damage to the joint is very advanced. Non-drug and non-surgical methods for the prevention and treatment of osteoarthritis are gaining popularity.. Here, the methods of physical and rehabilitation medicine and mud therapy in particular come into consideration.

Mud interacts in a complex way with thermal, chemical, mechanical, electrodynamic, biological and other factors. The thermal and chemical factors are of particular importance for the healing results. The mud has a high thermal capacity and low thermal conductivity and convection, which makes it a good physiological stimulant. The chemical effect is determined by the passage of ions, water-soluble substances, salts and vitamins through the skin. The mechanical action of the mud accelerates lymphatic and venous oedema formation. Liman mud has pronounced anti-inflammatory, analgesic and immunostimulant properties, improves blood circulation and activates metabolism. It has a positive effect on the metabolism and nutrition of the tissue and promotes tissue regeneration.

The main methods of using mud treatment for osteoarthritis are

Egyptian method - one of the oldest methods of applying healing mud. It is usually performed near the natural pillar deposit. The body is warmed in the sun, then smeared with mud and left in the sun until it dries to a moist crack, followed by a wash with warm seawater.

Mud applications - these involve preheating the mud to a temperature of about 40 degrees and wrapping the problem area of the body or the whole body. The mud is then wrapped in nylon and a blanket is placed over it. The treatments last 20-30 minutes.

Mud baths - healing mud is diluted with mineral, sea or normal water in various proportions.

There are a number of studies in the scientific literature that demonstrate the anti-inflammatory and cartilage-protective effects of mud.

Treatment with mud compresses has been shown to significantly reduce pain and functional status in patients with knee osteoarthritis. Direct application of the mud gave better results, suggesting that the chemical properties of the mud contribute to a better therapeutic effect (Ersin Odabasi 2008)

Cytokines and growth factors are believed to have a significant role in the preservation or degeneration of cartilage, even if the causes of cartilage protection are not entirely understood. The investigation of chondrocytes and their metabolic processes has gained more and more attention. Several pharmacological research include the investigation of chondrocyte function. Guengen et al. examined the impact of healing mud on serum levels of insulin-like growth factor 1 (IGF1) and tumour necrosis factor-alpha (TNF), which are involved in the preservation or degeneration of cartilage, in a randomised control trial from 2012. (Güngen 2012)).

According to earlier research, thermal mud has an anti-rheumatic effect and has an impact on a number of biochemical markers through processes other than only the thermal one. An anti-inflammatory substance called a sulphoglycolipid created by the colonizing bacteria during the maturation phase is what gives mature thermal mud its therapeutic effects. (Simona Bellometti 1997)

Anabolic and catabolic functional pathways are activated by different external stimuli (cytokines, growth factors, mechanical stress) in chondrocyte function during cartilage remodelling. Even minor perturbations over a long period of time can cause the matrix to deteriorate to the point where it becomes less able to tolerate joint loads, eventually resulting in severe degenerative alterations.

Liman mud therapy alters the serum levels of cytokines crucial to the etiology of osteoarthritis and chondrocyte metabolism. (Bellometti S 1998).

According to a meta-analysis of six randomised controlled trials and one prospective comparative investigation, mud therapy had a demonstrably beneficial impact on knee osteoarthritis patients' ability to manage their pain. (Hua Liu\* 2013).

In a double-blind trial, Sukenik and colleagues looked at 28 rheumatoid arthritis patients who received mud compresses from the Dead Sea once a day. These compresses were heated to 40 °C and administered for 20 minutes to the four limbs, the neck, and the back. Real mud compresses were used on the experimental group, while less concentrated mud compresses were used on the control group. The length of morning stiffness, handgrip strength, activities of daily living, self-rated disease activity, the number of active joints, and the Ricci index were all considered clinical indicators. A statistically significant improvement ( $p < 0.01$  or  $p < 0.05$ ) was found in the experimental group in terms of clinical indicators up to three months after the end of treatment (Sukenik 1992).

In a review of 20 studies on pain, function, and quality of life in patients with knee osteoarthritis treated with liman mud, Espejo-Antnez et al. reached similar conclusions in 2013. According to the researchers, mud therapy is an effective alternative method of treatment (Espejo-Antnez L 2013).

A 2015 study looked at the effect of mud bath therapy on people with psoriatic arthritis who were taking 'biological' TNF-blocking drugs (R. B. Cozzi F 2015). Half of the 36 participants received mud bath therapy in addition to their TNF blocker treatment, while the other half received the drug alone. The Psoriasis Area and Severity Index (PASI), ultrasound, and the number of swollen and painful joints were all used by the researchers to assess outcomes. The mud bath group showed significant improvements that the control group did not. As a result, the researchers concluded that mud bath therapy is effective in reducing joint inflammation in PsA patients. (R. B. Cozzi F 2015)

In 2018, a similar study looked at the outcomes of mud therapies for psoriatic arthritis. It was discovered that, despite the fact that there are only a few randomised controlled trials, they produce positive results. (C. L. Cozzi F 2018)

A 2018 review by Fraioli concluded that mud baths and mud applications for knee osteoarthritis are effective in reducing pain, improving function, improving quality of life, preventing secondary knee osteoarthritis, and reducing the use of NSAIDs (Fraoli A 2018).

Dischereit's 2019 study sheds more light on the efficacy of mud baths. Patients with rheumatoid arthritis, ankylosing spondylitis, and other inflammatory, degenerative conditions were given a three-week course of nine mud baths, while a control group received physiotherapy. The mud bath group experienced longer-lasting improvements in function, pain intensity, and disease activity after treatment. The physiotherapy group showed some improvement, but not as much as the mud bath group.

In addition, the researchers found that the mud bath group showed significant changes in two biomarkers associated with inflammation: a decrease in levels of the proinflammatory cytokine interleukin-1 beta (IL -1ss) and an increase in levels of the anti-inflammatory cytokine interleukin-10 (IL - 10) (Dischereit G 2019).

## Conclusion

The estuarine mud has anti-inflammatory, analgesic, and immune-stimulating properties, as well as the capacity to enhance blood circulation and stimulate the metabolism. It has a positive effect on the metabolism and nutrition of the tissue and promotes tissue regeneration.

The chemical effect is determined by the passage of ions, water-soluble substances, salts and vitamins through the skin.

The high content of sulphur ions in estuarine mud is essential for the synthesis of some important proteins (cytokines). The use of healing mud as an alternative treatment method for osteoarthritis results in pain relief, suppression of inflammatory processes, restoration of joint functions, and an improvement in quality of life.

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