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Low cost method for treatment of osteoarthritis developed by IIT Roorkee researchers

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The research published in the â??Journal for Materials Science - Biomaterialsâ?? talks about the use of implantable ferromagnetic nanoparticles with thermal properties for hyperthermia treatment of the afflicted knee joints



Researchers at the Indian Institute of Technology Roorkee have come up with a new, low-cost method for treating Osteoarthritis.

The research published in the ‘Journal for Materials Science - Biomaterials’ talks about the use of implantable ferromagnetic nanoparticles with thermal properties for hyperthermia treatment of the afflicted knee joints.

The team at IIT Roorkee developed a specific ferrite nanomaterial, which when embedded with Poly (vinylidene fluoride) is proposed as a biocompatible magnetic-dielectric composite to provide prolonged thermo-regulated treatment. These polymers based nanoparticles injected around the knee joint along with normal heat therapy will be able to provide long term heat therapy for the patient.

Talking about the research, lead researcher Prof. K.L. Yadav, Professor and Head of Physics Department at IIT Roorkee said, “Currently, the treatment of Osteoarthritis is done using anti-inflammatory drugs and steroids, which have critical side effects on patients. Also, the treatment using such drugs cannot inhibit the natural progression of this degenerative disease. Other than these, techniques like knee replacement are also used, but are expensive and have a long recovery time. We wanted to develop a low cost, affordable, safe and simple therapeutic technique to inhibit the progression of the disease and enable the patient to recover faster.”

“We developed magnetic polymer matrix composite using ferromagnetic nanoparticle structures insulated with Poly (vinylidene fluoride) polymer. It is proposed that the synthesized material in a liquid form may be injected into the affected knee joint. Once the liquid is inserted into the knee joint, the hyperthermia treatment through electromagnetic radiation can be given on the specific area at regular intervals. The heat generated during this process by the nanoparticles will spread over the afflicted area for a long duration without affecting the nearby cells or tissues. This will help us in getting a focussed treatment only in the area where the therapy is required”, he added.

The team studied the effectiveness of the developed composite for the hyperthermia treatment using a model of Knee Patella in COMSOL Multiphysics software and preliminary biocompatibility studies were also undertaken to ensure safe biomedical application and use.