



Review Article

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A REVIEW ON THE MODE OF ACTION OF AGNIKARMA IN KNEE OSTEOARTHRITIS

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ABSTRACT

Osteoarthritis is a joint disorder which commonly affects the weight bearing joints, especially during old age. It is said to be caused due to wear and tear of joints. In the Asian population, Knee Osteoarthritis is the most common. The clinical presentation includes pain, particularly after prolonged activity and weight-bearing, whereas stiffness is experienced after inactivity. Agnikarma is widely practiced as a quick pain-relieving panacea in this condition. Agnikarma, the most powerful parasurgical procedure in Ayurveda, was first explained by Acharya Sushruta. Sushruta mentions the use of Agnikarma in the diseases affecting Sira (vessels), Snayu (ligaments), Sandhi (joints) and Asthi (bones). Sushruta also mentioned Agnikarma as a treatment modality of Sandhigata Vata. Osteoarthritis can be correlated with Sandhigata vata in Ayurveda. Several studies were conducted to analyze the efficacy of Agnikarma in Knee Osteoarthritis which yielded positive results. The actual mechanism of action of Agnikarma in the management of Knee Osteoarthritis is not yet fully understood, though several theories such as that based on gate control theory, vasodilatation theory etc were put forward by researchers to explain the mode of action. The present work analyses the prominent hypotheses that explain the mode of action of Agnikarma in Knee Osteoarthritis and also explores other possible explanations.

Keywords: Osteoarthritis, Agnikarma, Sandhigata Vata

INTRODUCTION

Osteoarthritis generally considered as a degenerative joint disease is noted as prime cause of disability in the old age population. Knee joint is one of the major sites affected by this condition. In Indian population, knee osteoarthritis is the most common form of arthritis. Osteoarthritis primarily affects the articular cartilages of the synovial joints, and Pathophysiologic changes occur in the synovial fluid, subchondral bone, the overlying joint capsule and other joint tissues. Even though Osteoarthritis is considered as a non-inflammatory arthritis, increasing evidence has shown that inflammation tends to occur as agents such as cytokines and metalloproteinases are released into the joint¹. These changes result in hyaline articular cartilage loss, accompanied by increasing thickness and sclerosis of the subchondral bony plate. There will be outgrowth of osteophytes at the joint margin, also stretching of the articular capsule, mild synovitis in many affected joints, and weakness of muscles bridging the joint. In knee joints, meniscal degeneration is part of the disease. Radiological findings which can be observed are focal narrowing of joint space, presence of marginal osteophytes, with varying degrees of subchondral sclerosis, bone 'cysts', osteochondral 'loose' bodies, and eventually bone attrition and deformity².

Knee osteoarthritis is characterised by a slowly increasing aching pain in and around knee joint which usually get worse after unusual activity and grating may be felt or heard on movement. Morning stiffness less than 30 minutes and stiffness of knee joint after a period of inactivity are common features. The patient will primarily have difficulty in walking on uneven surfaces and climbing stairs. As the movements cause pain, the patient chooses to remain idle resulting in the wasting of the quadriceps muscle. As the condition progresses, there will be restriction in the range

of the knee joint movements (flexion and extension). Further it may progress to gross deformity of the knee joints.

While analysing the clinical presentation, Sandhigata Vata is a probable classical correlation to Osteoarthritis. Acharya Sushruta has specifically mentioned Agnikarma in the management of Sandhigata Vata. Agnikarma is clinically used as a fast and effective procedure in the management of pain in Knee Osteoarthritis.

There are therapies with similar principles and methodology in various alternative systems of medicine as of Agnikarma in Knee Osteoarthritis. Moxibustion (Zhen-jue) is a traditional Chinese medicine therapy which consists of burning dried mugwort (moxa wool) on particular points. 'Tau-dam' is basically a traditional Himalayan therapy similar to Agnikarma chikitsa, practiced by the rural Himalayan people for various diseases like liver troubles, stomach troubles, backache etc.

The actual process by which the Agnikarma manages pain is not yet fully understood. The present work is a humble effort to analyse all the possible theories related with mode of action of Agnikarma in Knee Osteoarthritis.

Several works done on assessing the efficacy of Agnikarma in knee Osteoarthritis were collected and analysed for probable theories regarding mode of action of Osteoarthritis. An elaborate literary search was done on various aspects of Agnikarma and Osteoarthritis. The data collected was systematically analysed to draw conclusions.

Methods

Procedure of Agnikarma

Agnikarma is a parasurgical procedure done under aseptic precaution in three Upakrama (steps of management), i.e. Poorva karma (Pre-operative), Pradhana karma (Operative) and Paschat karma (Post-operative).

Poorva karma

Materials required: Antiseptic solution for cleaning, sterile cotton, Dahana Upakarana, Artery forceps, Madhu as per requirement, Ghrita as per requirement and Aloe vera pulp as per requirement.

The procedure was explained in detail and written informed consent was taken. Patient was made to sit comfortably. The knee and surrounding area was cleaned with the antiseptic solution and allowed to dry.

Pradhana Karma

The patient was made to lie down comfortably with knee flexed at 90 degree. The tender points were marked over the knee. Agnikarma was done at maximum painful and tender site on the knee with the Dahanopakarana after making it red hot (or after making it boil in case of Snigdha Agnikarma). Agnikarma is usually done in Bindu vishesha. As it cools, immediately apply *Aloe vera* pulp to relieve burning pain. An area of about 3 – 5 cm² were covered in each Agnikarma procedure with maximum 15 points and minimum 10 points.

Paschat karma

After wiping off *Aloe vera* pulp, a mixture of Madhu and Ghrita was applied immediately. Patient was observed for 30 minutes after procedure. The burnt spots were cleaned and was advised to apply Madhu-Ghrita mixture over burnt spots twice daily for three days. Patients were advised to avoid contact with water over burnt spots for 24 hours.

Study conducted by Sharma *et al* in IPGT & RA, Jamnagar 33 patients of Janugata Sandhivata (Knee OA) randomly divided into two groups. In Group A (n = 18), Agnikarma was done with Pancha dhatu Shalaka once every week for one month while in Group B (n = 15), Agnikarma along with Panchatikta Guggulu orally was given for one month. It was observed that the symptoms of knee OA were much reduced in Group A in comparison to Group B³.

Study conducted by Priyanka Ganguly and Manjunatha Bhat in Alva's Ayurveda Medical College, Karnataka on the comparative effect of Agnikarma using Tapta Kshaudra and Pancha dhatu Shalaka in pain management of Janusandhigata vata (Knee Osteoarthritis) on 20 patients each in three sittings showed significant reduction in pain in both groups⁴.

Study conducted by Jiji G *et al* in Government Ayurveda College, Thiruvananthapuram, Kerala to study effect of Agnikarma in Knee Osteoarthritis when compared to Upanaha sweda 60 patients (30 in each group), found out that Agnikarma with Shalaka done in two sittings with weekly interval was more effective in managing the symptoms of Knee Osteoarthritis when compared to Upanaha sweda with Vachadi choorna for 7 days⁵.

DISCUSSION

Discussion on the mode of action as per Ayurveda

Sandhigata Vata is caused by vitiated Vata Dosha along with Anubandha of Kapha Dosha. Agnikarma can be considered as the best line of management of this disease because it mitigates both Vata and Kapha Doshas. The Ushna, Teekshna, Sookshma and Ashukari Gunas of Agni are just opposite to the Gunas of Vata and Kapha⁵.

By the action of these gunas, Srotavarodha of the affected part might be cleared and the vitiated Vata and Kapha Doshas get pacified immediately. The Rasa Rakta Samvahana at the site of Agnikarma may be enhanced thereby Mamsadi Dhatus get proper nourishment⁵.

Due to the Vata Vriddhi and Anubandha of Kapha, Agnimandya develops at Dhatwagni level. Due to the Ushnaadi Gunas of Agni, Agnimandya can be corrected thus the Ama Pachana can be ensured. Due to Vriddhi of Poorva Dhatus, Uttara dhatus like Asthi and Majja get Poshana (nourishment) which are mainly involved in Sandhigata Vata⁵.

The Sheeta Guna of Vayu and Anubandha Kapha can be pacified by Ushna Guna of Agni hence symptoms like Vedana and Stambha were relieved. In Yajñapurusha Adhyaya, Acharya Charaka has described that Agni is the best treatment for Shoola (pain). There is a concept of Avarana in Ayurvedic pathophysiology to produce diseases where the main Dosha is Avrita by other Dosha. In Vata and Vata-Kapha disorders, there may be Kapha or Meda Avrita Vata. These Avarana may hamper the proper Gati of Vata and creates Shoola. Ushna Guna of Agni helps to remove the Avarana effectively and stabilizes the movement of Vata and provides relief from Shoola.

Mode of action as per Modern view

The Gate control theory of pain has been employed by most researchers in Ayurveda to explain the mechanism of pain management by Agnikarma in various conditions. This theory proposed by Melzack and Wall in 1965 explains the underlying mechanism by which painful sensations can be reduced by non-painful sensations⁶.

Gate control system is located at the junction of first and second neuron. Large 'A' fibre is stimulated by temperature and touch. Fine 'C' fibre is stimulated by pain⁷. The minimum heat required for skin burn is measured as 40.55 degree Celsius. The heat above 43 degree Celsius produces peripheral stimulation on skin thus low-threshold myelinated nerve fibres will be activated. The afferent input from these fibres inhibits propagation of nociception carried through unmyelinated fibres developing due to O.A. This results in the increase of beta endorphin, met-enkephalin which has anti-nociceptive effect³.

The effect of Agnikarma on pain produced in Osteoarthritis is temporary which depend upon the production of the endorphins. Endorphin release varies among the individuals. This means that two people who suffer the same degree of pain will not necessarily produce similar levels of endorphins. Feeling of pain is less with high production of endorphins.

The theory of vasodilatation suggests that superficial heating agents such as hot packs or hot baths have the greatest effect on cutaneous blood vessels, resulting in the greatest temperature change within the first 1 cm of the tissue depth³. The increased superficial tissue temperature activates release of chemical

mediators such as histamine and prostaglandin which results in vasodilatation. The stimulation of cutaneous thermo receptors that synapse on the cutaneous blood vessels causes the release of bradykinin to relax the smooth muscle walls also resulting in vasodilation^{3,5}. The reduction in sympathetic activation via spinal dorsal root ganglia to reduce smooth muscle contraction, results in vasodilatation at the application site and at the cutaneous blood vessels of the extremities. These factors altogether act for increased blood flow to the area enhancing the delivery of nutrients, more efficient removal of waste products and reduction of ischaemia of injured tissue, thereby hastening the natural process of repair.

Studies evaluating the effect of moxibustion, which can be called as a contemporary of Agnikarma in Chinese medicine, in Osteoarthritis suggest the thermal stimulation may influence the morphology of mast cells in the local site of moxibustion, promotes their degranulation⁸. A study done to investigate the effects of 10.6 µm laser moxibustion on a monosodium iodoacetate (MIA)-induced knee osteoarthritis pain model in rats found out that early laser moxibustion markedly inhibited the destruction of articular cartilage and matrix degradation and decreased the OARSI score⁹. Similar studies need to be done in Ayurveda to assess the relevance of these findings in the context of Agnikarma.

When the cells are exposed to elevated temperature, they respond by expression of heat shock proteins (HSPs), also called stress proteins. HSPs are believed to play a role in the presentation of pieces of proteins or peptides on the cell surface to help the immune system recognize diseased cells. The production of heat shock proteins is believed to produce chondroprotective effect in the cases of osteoarthritis. The HSP70 have been demonstrated to have anti-apoptotic and anti-inflammatory action. These properties could delay the degradation of the extracellular matrix occurring during OA progression¹⁰.

CONCLUSION

The above said theories are more of a speculation than actual validated theory. Evaluating the present results, it may be concluded that there is no one single mechanism for the action of Agnikarma in Knee Osteoarthritis. The collective action of the above said mechanisms of release of endorphins, the local vasodilatation, increase in tissue extensibility, the production of heat shock proteins etc results in the efficacy of Agnikarma in the management of Knee Osteoarthritis. These theories need to be subjected to further research and there is also a need of study to assess the long-term effects of Agnikarma in Knee Osteoarthritis.

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