

# The Antiseptic

Estd.1904

Indexed in  
IndMED

A MONTHLY JOURNAL OF MEDICINE AND SURGERY

Email: [admin@theantiseptic.in](mailto:admin@theantiseptic.in)

[www.theantiseptic.in](http://www.theantiseptic.in)

Vol. 113 • No. 12

DECEMBER 2016

ISSN 003-5998 • ₹ 100



**Indians to get free 50 essential medicines**

- Page No : 12

**Cardiac surgery associated acute kidney injury**

- Page No : 20

# Nutraceuticals and Osteoarthritis

**SANJAY AGRAWAL**

Arthritis may have originated before man itself since it also afflicts other primates<sup>1</sup>. The disease causes disability due to pain and inflammation in joints. There are many different types of arthritis of which rheumatoid arthritis and osteoarthritis (OA) are the most common. Rheumatoid arthritis is an autoimmune disease that affects mainly small joints such as those in the fingers of the hand. OA affects large joints such as hips and knees and also those in the hands. OA is a leading cause of disability with an unknown cause or cure. The global age standardized prevalence of OA in the knee and hip has recently been reported to be 3.8 and 0.85 %, respectively<sup>2</sup>. Worldwide estimates indicate that 9.6 % of men and 18 % of women  $\geq 60$  years have symptomatic OA. Other risk factors of knee OA include trauma such as torn meniscus, occupation, exercise, gender (more common in females), ethnicity, genetics, obesity, diet and bone density<sup>2</sup>. Since OA normally progresses with age, its economic burden may increase with the aging human population in the coming decades. This review will focus on knee OA which is more common. The knee joints are the largest and being synovial joints, they provide a very high degree of mobility. A knee joint provides two articulations - one between tibia and femur and the other between patella and femur<sup>3,4</sup>. The joints allow for flexion, extension and a limited degree of rotation. It contains a bone-cartilage interface and a synovial body. The synovial body contains the fluid

whose composition and viscosity are key to the knee operation. The bone-cartilage interface is a complex functional unit and biocomposite at the centre of joint function in which the individual components interact cooperatively and synergistically. Due to this intimate contact between bone and cartilage, any changes in either tissue will influence the other component.

## **Current therapies for management of knee OA**

There are a large number of treatments of varying efficacy and faith for OA. The non-pharmacological treatments include education, exercise, physiotherapy, weight loss, physical aids (supports, braces and walkers) and surgical joint replacements<sup>5,6</sup>. Massage with and without pharmacological agents may also be beneficial. Vitamins and herbs have also been used. Physical aids may enable the mobility of the patients and allow them to carry out more physical activity. Thus, even then the aim remains an increased physical activity through some form of exercise. Weight loss is the common mantra of the health care professionals for the management of OA, it is moderately recommended by AAOS but its validity may be questionable. A variety of exercise programs of varying effectiveness are available for knee arthritis. It appears that for OA patients, exercises involving supervised slow movements or isometric exercises may be efficacious and also have a lower possibility of damage to the joint than other exercises<sup>6</sup>. Therefore, aquatic exercises, yoga and tai chi should be preferred. This is one of the strongest recommendations from the AAOS. Running on treadmills

should be avoided. For less severe OA some exercises with slower movements and greater resistance may be added. Since the type, intensity and dose of exercise may benefit each patient differently, physiotherapy is often used to determine the type and extent of the exercises. It is claimed that primary care physiotherapists and pharmacists may improve short term outcomes for older adults with knee pain and reduce the use of NSAIDs. A long term randomised trial which will monitor the effectiveness of community therapy and enhanced pharmacy review for people over the age of 55 has been initiated<sup>6</sup>.

Several pharmacological agents have been used for management of OA. Temporary pain relief and hence improvement in function may be obtained with analgesics but this is not specific to OA. NSAIDs are used orally and topically because they have some anti-inflammatory and analgesic effects. They are also strongly recommended by AAOS. However, they may have severe adverse effects upon prolonged use. These issues have been discussed in recent reviews and will not be retraced here. There are several commercial preparations such Instaflex, Sierrasil, hyaluronic acid and Aquamin of limited proven usefulness. However, the combination of glucosamine and chondroitin sulfate is the most promising. This treatment may be efficacious for pain relief, functional improvement and also result in less joint space narrowing. Herbs have been used for such treatment since ancient times in Indian medicine (Ayurvedic) and Chinese medicine. Most of these herbs have antioxidant properties: they contain compounds or chemicals that can modulate

Dr. Sanjay Agrawal,  
Leading Pharmaceutical Consultant and  
Editor-in Chief of IJMToday,  
6/146, Malviya Nagar, Jaipur-302017, Rajasthan,  
Specially Contributed to "The Antiseptic"  
Vol. 113 No. 12 & P : 28 - 29

oxidative metabolism which is altered during OA. Many in vitro studies are available in this area. However, the human body is more complex than the cells cultured in defined growth media. Oxidative stress may play a role in several diseases but the benefits of different antioxidant supplements may be unique to each one. We recently reviewed the literature on the benefits of antioxidants in vision health and in obesity-diabetes II. In vision health, the antioxidant supplements containing vitamin C, vitamin E, lutein, zeaxanthin, zinc and copper have a reasonable probability of retarding age related macular degeneration but the benefits in other eye diseases are questionable. In obesity and diabetes 2, there are marginal benefits of supplementation with zinc, lipoic acid, carnitine, cinnamon, green tea, and possibly vitamin C plus E. Some of the antioxidants are beneficial for obesity and others are better for glucose level regulation<sup>7-9</sup>.

#### Antioxidant supplements and OA

The role of ROS in the pathophysiology of knee OA provides for the rationale that suppressing the ROS levels with the appropriate antioxidant supplements may retard the progress of the disease. What remain to be discussed are the reality of the observations on the effects of such supplements on prevention and/or management of OA. The effects of food intake and various vitamins and related compounds on OA has been examined and reviewed. One concludes that nutritional habits involving fruits, fruit juices and vitamin supplements may be beneficial in the long run but they may not help once OA has already been initiated. Several antioxidant supplements derived from turmeric, avocado, Boswellia and other herbs will be discussed<sup>10,11</sup>.

#### Turmeric

Curcumin, a compound with antioxidant properties, was isolated from turmeric about 200 years ago. The properties of curcumin and its potential role in the therapy of several chronic diseases including arthritis, cancer and neuronal disorders have been explored. The rationale for its use in OA comes from several in vitro studies. Curcumin inhibited the matrix degradation of articular explants and chondrocytes. It decreased the production of MMP-3, -9 and -13 via c-Jun-N-terminal kinases, nuclear factor kappa-beta (NFκβ), and the JAK/STAT pathways. It also restored type II collagen and glycosaminoglycan synthesis<sup>10</sup>.

#### Avocado-soya extract

Avocado and soybean oils are used for manufacturing soap and the unsaponifiable fraction from these oils is termed avocado/soybean unsaponifiable (ASU). ASU has been tested in the management of OA.

#### Boswellia

Resins from trees of *Boswellia serrata*, and other species of this genus, have been used for arthritis and other diseases in Ayurvedic medicine since ancient times in India where it is termed shallaki or salai. *Boswellia* resins contain several different boswellic acids such as beta-boswellic acid, keto-betaboswellic acid, and acetyl-keto-beta boswellic acid (AKBA). AKBA is an inhibitor of the lipoxygenase pathway and is suggested to have anti-inflammatory properties<sup>11</sup>.

#### Ayurvedic and Chinese medicines

Several herbal products containing antioxidants are used in Ayurvedic medicine. For example, roots of *Withania somniferum* are used to prepare ashwagandha. It contains withanoloids, most importantly withaferin A. *Tinospora cordifolia* (Guduchi) is considered a divine herb and it contains diterpenoids termed

tinosporides. *Emblica officinalis* (or *Phyllanthus emblica*) is termed amla or amlaki and is rich in vitamin C and emblicanins A and B. *Zingiber officinale* (Ginger) root is not only used extensively in cooking but also has several medicinal antioxidants. The analysis of volatile oils of fresh and dried ginger showed camphene, p-cineole, α-terpineol, zingiberene and pentadecanoic acid as major components.

#### Recommendations

This review shows that there is some evidence for benefits of antioxidant supplements in pain relief and function in knee OA. These supplements with the most evidence include curcumin, avocado-soya bean unsaponifiables, *Boswellia* and several preparations used in Ayurvedic and Chinese medicine. These should be tested further and used, at least, to decrease the use of NSAIDs which have more adverse effects. Ancient medicine should be tested as such rather than proprietary products made from them. It should be assessed whether diet with turmeric and black pepper results in sufficient levels of serum curcumin. Promotion of dietary habits may be more economical and of longer term benefit than the development of products made from extracts used in ancient medicine.

#### REFERENCES

- Alexander CJ. Utilization of joint movement range in arboreal primates compared with human subjects: an evolutionary frame for primary osteoarthritis. *Ann Rheum Dis*. 1994;53:729-35.
- Wade GJ. Rethinking the model of osteoarthritis: a clinical viewpoint. *J Am Osteopath Assoc*. 2011;111:631-7.
- Yuan XL, Meng HY, Wang YC, Peng J, Guo QY, Wang AY, et al. Bonecartilage interface crosslink in osteoarthritis: potential pathways and future therapeutic strategies. *Osteoarthritis Cartil*. 2014;22:1077-89.
- Ashford S, Willard J. Osteoarthritis: a review. *Nurse Pract*. 2014;39:1-8.
- Juhl C, Christensen R, Roos EM, Zhang W, Lund H. Impact of exercise type and dose on pain and disability in knee osteoarthritis: a systematic review and meta-regression analysis of randomized controlled trials. *Arthritis Rheumatol*. 2014;66:622-36.
- Foster NE, Healey EL, Holden MA, Nichols E, Whitehurst DG, Jowett S, et al. A multicentre, pragmatic, parallel group, randomized controlled trial to compare the clinical and cost-effectiveness of three physiotherapy-led exercise interventions for knee osteoarthritis in older adults: the BEEP trial protocol (ISRCTN: 93634563). *BMC Musculoskelet Disord*. 2014;15:254.
- Adatia A, Rainford KD, Kean WF. Osteoarthritis of the knee and hip. Part II: therapy with ibuprofen and a review of clinical trials. *J Pharm Pharmacol*. 2012;64:620-36.
- McCarberg B, Tenzer P. Complexities in the pharmacologic management of osteoarthritis pain. *Curr Med Res Opin*. 2013;29:539-48.
- Frestedt JL, Kuskowski MA, Zerk JL. A natural sesame seed derived mineral supplement (Aquamin F) for knee osteoarthritis: a randomised, placebo controlled pilot study. *Nutr J*. 2009;8:7.
- Shen CL, Smith BJ, Lo DF, Chyu MC, Dunn DM, Chen CH, et al. Dietary polyphenols and mechanisms of osteoarthritis. *J Nutr Biochem*. 2012;23:1367-77.
- Moulinon TE, Jacques P, Zhang Y, Harman MT, Allabadi P, Weissman B, et al. Do antioxidant macronutrients protect against the development and progression of knee osteoarthritis? *Arthritis Rheum*. 1996;39:648-56.