EFFECT OF OBESITY ON OSTEOARTHRITIS


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ABSTRACT

The occurrence of obesity and diabetes has been increasing with alarming rate in recent years and become a common problem around the world including developing as well as developed countries with incalculable social as well as economic costs. Obesity and type 2 diabetes are two common co-morbidities occur together. Obesity and diabetes is closely associated with many diseases, such as osteoarthritis, hypertension, certain form of cancer, sleep-breathing disorders and coronary heart disease. Impacts of obesity on Osteoarthritis have been seen in patients and it may be controlled to some extent with the controlling of obesity. Arthritis is becoming pandemic around the globe and its occurrence with obesity has been observed more common than ever. In this review article we aimed to survey the literature covering the influence of obesity on Osteoarthritis and tried to focus on establishing a relation with controlling of obesity with this disease.

KEYWORDS: osteoarthritis, hypertension, certain form of cancer, sleep-breathing disorders and coronary heart disease.

INTRODUCTION

Obesity represents a major public health problem and carries with it the risk of developing significant medical problems. The global burden of obesity is rising at an alarming rate worldwide and also in India. The WHO estimates that in 2015, more than 1.9 billion adults worldwide were overweight and more than 600 million were obese[1] in the 21st century; obesity has reached epidemic proportions in India with morbid obesity affecting 5% of the country’s population. 12.1% of the males and 16% of the females are obese and Kerala ranks 2nd among the states with highest prevalence of obesity.[2]
OSTEOARTHRITIS

In India, Osteoarthritis is the most prevalent form of arthritis, affecting 15 million adults every year, with over 60 million cases likely by 2025. It is a chronic progressive degenerative disorder of the joints. The American College of Rheumatology Diagnostic and Therapeutic Criteria Committee defined OA as “A heterogeneous group of conditions that lead to joint symptoms and signs which are associated with defective integrity of articular cartilage, in addition to related changes in the underlying bone at the joint margins”.\[3\] OA causes pain and disability; especially in the old age.\[4\] The symptoms are characterized by joint pain, tenderness, limitation of movement, crepitus, occasional effusion, and variable degrees of local inflammation as the cartilage in the joints wears down over time.\[5\]

An increasing population of India is affected from several types of Osteoarthritis (OA). It is a common, age-related, chronic and slowly progressive joint disorder. Most common joints involved in osteoarthritic process are knees, neck, low back and small hand joints at fingertips. In fact these joints are used heavily in our day to day work and due to this are affected more.

In 1990, OA was estimated to be the 10th leading cause of non-fatal burden of disease in the world, accounting for 2.8% of total years lost due to disability (YLD). Whereas in 2000, it became the 4th leading cause, accounting for 3.0% of total global YLDs.\[6\] In India OA is the second most common rheumatologic problem and is the most frequent joint disease with prevalence of 22% to 39%.\[7-8\] Hence, OA represents a major cause of morbidity and disability, as well as a significant economic burden on patients and healthcare resources.\[9\]

The causes of osteoarthritis include a number of mechanical, biochemical and genetic components. However the major factors that increase the risk of OA are obesity, age more than 40, female sex, bone deformities, joint injuries, certain occupations that place repetitive stress on a particular joint that may predispose that joint toward eventually developing osteoarthritis and other diseases like gout, rheumatoid arthritis, Paget’s disease of bone or septic arthritis.

OBESITY AND KNEE OSTEOARTHRITIS

Population based studies of osteoarthritis have consistently shown that overweight persons are at higher risk of having knee osteoarthritis than non-overweight. Estimates of risk vary and depend to some degree on both the criteria for overweight and the definition of osteoarthritis.
The first National Health and Nutrition Examination Survey conducted throughout the United States in 1971-1975, it was found 2 obese women ((BMI) >30, yet < 35) had almost four times the risk of osteoarthritis as women whose BMI was <25. For men in the same overweight category (BMI >30, yet < 35), the risk was increased 4.8-fold over men who were of normal weight.

These risk estimates are similar to those found in other studies. This is because three to six times body weight is exerted across the knee during single leg stance in walking. Therefore any increase in weight may be roughly multiplied by this factor to reveal the excess force across the knee when an overweight person walks. While studies have shown a cross sectional association of obesity and osteoarthritis, there is the possibility that the persons who are overweight gained more weight after developing osteoarthritis due to their knee pain and sedentary level of activity.

Recent studies, however, have disproved this notion, showing that being overweight at an average age of 37 years, when osteoarthritis of the knee is extremely uncommon, increased the risk of developing knee osteoarthritis in people in their 70s. Also, repeated x rays of persons in population studies have now shown that baseline weight in a person without osteoarthritis is a potent factor affecting their risk of knee osteoarthritis later the age of 45.

Several other features of the association between obesity and knee osteoarthritis are noteworthy. Obese persons appear to be at an especially high risk of bilateral knee osteoarthritis as opposed to unilateral disease, the latter of which may be more often associated with knee injury. In some studies the relation between obesity and knee osteoarthritis has been stronger in women than in men. Obese women have an especially high risk of knee osteoarthritis, whereas obese men have a marginally higher risk than non-obese men.

**OBESITY AND HIP OSTEOARTHRITIS**

Overweight persons have a higher than expected risk of hip osteoarthritis, although the association of weight with hip osteoarthritis in most studies is not as strong as with knee osteoarthritis.

Several studies [10-13] have suggested that obese persons have an especially high risk of bilateral hip osteoarthritis. Also a systematic review found moderate evidence for a positive
association between obesity and the occurrence of hip OA.\textsuperscript{[11]} The associations between obesity and hip OA were stronger when the diagnosis included clinical as well as radiological criteria. Studies that include a large number of hip osteoarthritis cases have tended to suggest an association between obesity and hip osteoarthritis.\textsuperscript{[12-13]}

In over 5000 women with hip x-rays from the Study of Osteoporotic Fractures, obesity was associated with an 80% increase in the odds of bilateral hip osteoarthritis (odds ratio = 1.8) but only a 40% increase in unilateral osteoarthritis (odds ratio = 1.4).

**OBESITY AND HAND OSTEOARTHRITIS**

Interestingly people who are overweight also seem to be at higher risk of hand osteoarthritis than those who are not overweight. A recent study which continued over almost two decades showed that those who were overweight had a higher risk of developing hand osteoarthritis than those who were not.\textsuperscript{[14]} While another studies of the relation between overweight and hand osteoarthritis have not all been positive, most suggest an association. The reason is overweight persons do not necessarily have greater force across their joints than those who are not overweight, the relation between overweight and osteoarthritis remains enigmatic.

**THE BENEFIT OF WEIGHT LOSS IN OSTEOARTHRITIS**

There is increasing evidence that exercise is most effective in reducing both pain and mobility when combined with weight loss. A series of studies show that even modest weight loss, when combined with exercise, reduces pain in obese patients with knee osteoarthritis, as well as improving mobility and physical functioning. For instance, gradually losing just five to ten per cent of initial body weight over several months is worthwhile; for each bit of weight lost, there is a reduction in pain and disability caused by knee osteoarthritis.

Normal weight is associated with a decreased risk incidence and progression of OA.\textsuperscript{[15,16]} Both the American College of Rheumatology (ACR) and the European League Against Rheumatism (EULAR) recommend weight loss and exercise for obese patients with knee OA.\textsuperscript{[17,18]} In the Framingham study, evaluation of 800 women showed a decrease in BMI of \( \geq 2 \text{ kgm}^{-2} \) in the preceding 10 years decreased the odds of developing symptomatic OA by >50%.\textsuperscript{[16]} It has also been suggested that if all overweight and obese people reduced their weight by 5 kg or until their BMI was within the normal recommended range, 24% of the surgical cases for knee OA might be avoided. Recently, a large clinical trial, the ADAPT study, randomized 316 overweight or obese older subjects with knee OA to exercise.
only (combined aerobic and strengthening), dietary weight loss only, exercise plus dietary weight loss or a healthy lifestyle control group. After 18 months, despite only modest reductions in body weight, significant improvements in pain and physical function were seen in the diet plus exercise group compared to the healthy lifestyle group, but not for the weight loss or exercise-only allocations.\(^{20}\) Such drastic measures are not appropriate for everyone with an obesity problem. Yet anyone whose weight problem puts them at risk of developing or worsening the symptoms of osteoarthritis deserves such types of weight loss programme.

NON-SURGICAL THERAPIES FOR OSTEOARTHRITIS
There is no cure for osteoarthritis. Medical treatments can improve symptoms but without lifestyle change, may have little benefit. Analgesics such as paracetamol may help to relieve pain. Non-steroidal anti-inflammatory drugs (NSAIDs) may reduce inflammation and thereby pain and stiffness. Such types of drugs can also be helpful with knee and hand osteoarthritis. A course of physiotherapy may reduce pain and strengthen muscles. In the case of severe osteoarthritis, a steroid injection into the joint may successfully relieve pain for a period of time, especially in the knee or thumb.

TREATMENT IN AYURVEDA FOR OSTEOARTHRITIS
Due to only moderate effectiveness and potential side effects of conventional treatment, both patients and health care professionals are seeking out alternative therapies, including those offered by the ancient healing system known as Ayurveda. Ayurveda offers many herbal treatments for OA. These plants have documented anti-inflammatory properties without the side effects of commonly prescribed medications. For example, a recent study showed an herbal Ayurvedic therapy to be as effective in treating knee osteoarthritis as a commonly prescribed medication (Celebrex) and glucosamine and with fewer side effects.

The herbs like boswellia, turmeric, ashwagandha, ginger, triphala, guggulu, and shatavari have all been shown to decrease inflammation by interfering with the production of inflammatory chemicals in the body.

Boswellia
There is evidence that the Ayurvedic herb *Boswellia serrata*, also called Indian frankincense, alleviates joint pain and inflammation. Boswellia blocks an enzyme (5-lipoxygenase) that plays a major role in the formation of chemicals called leukotrienes, which stimulate and perpetuate inflammation. Researchers have found that people with osteoarthritis who took
boswellia along with ashwagandha, turmeric, and zinc reported less joint pain and increased mobility and strength.

**Turmeric**

Turmeric is a spice commonly used in South and East Asian cooking. It is also used both orally and topically in traditional Ayurvedic medicine to treat a wide variety of ailments, many of which are related to inflammation. The active ingredient in turmeric, curcumin, has been shown to inhibit key inflammation-producing enzymes (lipo-oxygenase, cyclooxygenase, and phospholipase A2), thus disrupting the inflammatory cascade at three different stages. Interestingly, some data suggests that it may protect the stomach against non-steroidal anti-inflammatories (NSAIDs). Although current studies for its use in treating osteoarthritis are few, curcumin/turmeric is a promising option in the treatment of OA.

**Ashwagandha**

Another Ayurvedic herb, ashwagandha (*Withania somnifera*), has known anti-inflammatory effects. In a study published in 2007, the extract of this herb was found to suppress the production of pro-inflammatory molecules (TNF-alpha and two interleukin subtypes. In one study, the anti-inflammatory effect of ashwagandha was comparable to taking the steroid hydrocortisone.

**Ginger**

The anti-inflammatory effects of ginger (*Zinziber officinale*) have also been documented. Ginger works as an anti-inflammatory by interfering with an enzyme (cyclooxygenase) that produces inflammatory chemicals in the body. There is some data showing that ginger has a moderate beneficial effect on OA of the knee. Further research is needed to determine the extent of ginger’s effectiveness in treating OA.

**Triphala**

The Ayurvedic herb triphala has been used in India for thousands of years for treatment of osteoarthritis. Triphala is a formulary that consists of three herbs (amalaki, haritaki, and bibhitaki). Preliminary studies show that the herbs in triphala have anti-inflammatory effects.

**Guggulu**

In addition, the herb guggulu (*Commiphora; guggul*) has been shown to be a potent inhibitor of the enzyme NFkB, which regulates the body’s inflammatory response. There are several
studies that show decreased inflammation and joint swelling after administration of extracts of guggulu resin.

**Shatavari**

Shatavari (*Asparagus racemosus*) is an Ayurvedic herb that is considered to have a soothing, cooling, and lubricating influence on the body. Studies have found that it has an inhibitory effect on chemicals that create inflammation in the body, such as TNF-alpha, and IL-1B.

**Surgery**

Joint replacement surgery is usually undertaken as a last resort and is expensive. Surgery should be considered in all patients with inadequate pain control and functional improvement despite rigorous drug- and nondrug- therapy. A successful surgery offers excellent pain relief and should not be delayed whenever indicated.

**CONCLUSION**

Obesity has been the problem of effluent society of developing and developed worlds. Hence the diseases which are common manifestation of obesity are prevalent in obese persons. Diet and exercise interventions to reduce obesity are potentially cost-effective but have a negligible impact on the total body weight-related disease burden. Obesity is associated with a number of musculoskeletal conditions and is responsible for significant disability and impaired quality of life. The global obesity epidemic has significant consequences for both the individual and the community in terms of direct and indirect health-care costs. Further studies prospectively evaluating these conditions in the obese population are imperative to define better the mechanisms by which obesity mediates musculoskeletal disorders, and to determine the effects of moderate to large weight loss on these conditions. This has important ramifications in both the prevention and development of appropriate treatment strategies in the ongoing management of these conditions. In summary, being overweight is an important modifiable risk factor for osteoarthritis in the knees, hips, and hands. Weight loss may prevent disease, especially in the knees, and those who are overweight are at high risk of disease progression and are likely to have a progressive disease course. Also non surgical therapies like ayurvedic treatment, yogas and asanas are very useful in the treatment of several types of Osteoarthritis.

**REFERENCES**


