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Original Research Article

Beneficial role of Avocado oil orally used in Osteoarthritis: experience in a tertiary care hospital of Bihar, India

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ABSTRACT

Background: Osteoarthritis is the most common type of joint disease. It represents a heterogeneous group of conditions resulting in common histopathologic and radiologic changes. It is a degenerative disorder arising from biochemical breakdown of articular (hyaline) cartilage in the synovial joints.

Methods: Total of 90 patients were randomly selected from outdoor and indoor of Orthopaedics department (IGIMS Patna). Study was done in Department of Pharmacology & Orthopaedics at IGIMS Patna. Three groups A, B and C were taken. Each group was consist of 30 patients of both sexes and age groups between 18 to 65 years. Group A was received Multivitamin with Exercise. Group B was received NSAIDS only. Group C was received Avocado oil orally along with Exercises as Muscle strengthening exercises of Quadriceps, Hamstrings, Abductor and Adductor muscles of thigh. We had compared pain thresholds among all these three groups with the help of Visual analogue scale and Oxford Knee score.

Results: After 3 months of treatment the patients belonging to group C showed better response as compared to group A and B. When we compared pain threshold among group A, B and C on the basis of Oxford Knee score group C had occupied maximum score, which meant satisfactory joint functions and did not require any formal treatment. we also compared average visual analogue scale and average oxford knee score, Group C showed better response.

Conclusions: Avocado oil is a food supplement and does not contain any side effects as compared to NSAIDS [Non-steroidal anti inflammatory drugs], glucosamine sulfate, chondroitin sulfate, sulfasalazine etc so avocado oil can be used for long duration in case of osteoarthritis.

Keywords: Avocado oil, NSAIDS, Osteoarthritis, Oxford Knee score, Synovial joints, Visual analogue scale

INTRODUCTION

Osteoarthritis is a chronic joint disease characterized by pain and stiffness. It most commonly affects the weight-bearing joints like the knees and hips. The disease is characterized by its progressive nature, specially damage of articular cartilage, boneremodeling, new bone formation, synovial inflammation, and fibrosis. In smaller joints, such as at the fingers, hard bony enlargements,

called Heberden's nodes (on the distal interphalangeal joints) or Bouchard's nodes (on the proximal interphalangeal joints) occurs due to osteoarthritis. Causes include previous joint injury, abnormal joint or limb development and inherited factors.² Due to osteoarthritis there is breakdown of articular cartilage and underlying bone.³ Articular cartilage is the smooth coating that covers the surface of the bones inside a joint. Articular cartilage also cushions and helps lubricate the joint surfaces. Over

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time the articular cartilage can thin or form cracks. Pieces of articular cartilage may become loose and float inside the joint and further irritate the joint. After a long period of time the articular cartilage can become completely "worn away" and the bones can rub together. Osteoarthritis usually comes on slowly and results in joint pain stiffness and swelling. Sometimes a grating sound can be heard when a joint is moved such as the knee when going up or down stairs.

Some risk factors for Osteoarthritis include:

- Previous joint injury.
- Family history of Osteoarthritis.
- Damage to the joint from other types of arthritis.
- Increasing age.
- Being overweight (affects mainly weight bearing joints).

Treatment

Lifestyle modification (such as weight loss and exercise) and analgesics are the mainstays of treatment. Acetaminophen (also known as paracetamol) is recommended first line NSAIDS being used add on therapy only if pain relief is not sufficient.⁴

METHODS

The aims and objectives were to compare the efficacy of NSAIDs and AVOCADO OIL over pain threshold in case of osteoarthritis along with following objectives as:

- Comparative pain overcoming effects of NSAIDs and AVOCADO OIL along with exercise.
- Endurance of patient's day to day physical activities.
- Pain improvement during squatting position.
- Patient's sense of well being.

Total 90 patients were randomly selected from outdoor and indoor of Orthopaedics department. Study was done in Department of Pharmacology and Orthopaedics at IGIMS, Patna. Total three groups as A, B and C were taken. Each group consisted of 30 patients of both sexes and variable age groups between 18 to 65 years. Group A received Multivitamin with Exercise. Group B received NSAIDs. Group C received Avocado oil orally along with Exercise. Muscle strengthening exercises of Quadriceps, Hamstrings, Abductor and Adductor muscles of thigh was carried out. Wefollowed up the patients of all groups at OPD after 6weeks and 3months and compared the effects and pain threshold by Oxford knee score and Visual analogue score. The Oxford Knee Score has subsequently been validated for use in assessing other non-surgical therapies applied to those suffering from issues with the knee. 5 Visual analogue scales have superior metrical characteristics than discrete scales, thus a wider range of statistical methods can be applied to the measurements.⁶ Tablet paracetamol 650 mg twice daily was used as NSAID in patients of Group B, Soft gelatin capsule of avocado oil [300 mg] once daily was used in patients of Group C. In case of acute pain emergency tablet Ibuprofen 400mg was used as rescue medicine in case of patients belonging to Group C and Group A.

Study period was 3 months. It was prospective and interventional study.

Inclusion criteria

- Clinically and Radiologically diagnosed Osteoarthritis grade I and II
- Post traumatic arthritis

Exclusion criteria

- Arthritis due to connective tissue disorder.
- Patient age below 18 years and above 65 years.
- Non specific knee pain

Initial investigations

- Plain x-ray,Body mass index (BMI),Body weight
- Measurement of pain threshold

Following tests were performed to measure pain threshold.

- Oxford knee score
- Visual Analogue Scale

Average results from 90 patients

Group C has achieved better pain threshold score as comparison to Group A & Group B. Group B has occupied Average Visual Analogue scale of 3.37 and the Average oxford knee score of 40.20, but patients still complaining of mild pain and mild stiffness of joints, while patients have no any complain in Group C after enrollment of three months. The above data shows that patients receiving avocado oil have achieved better pain overcoming and anti inflammatory effects as compare to patients who are receiving Multivitamins with exercises & NSAIDS only. Avocado oil also showing better response towards joint stiffness among patients as compare to patients who receiving NSAIDS only and Multivitamins with exercises. Afer enrollment of 3 months patients have no any complain regarding joint stiffness when they are receiving Avocado oil.

Has achieved average Visual Analogue scale of 5.63 after enrollment of three months and achieved average oxford knee score of 19.80 after enrollment of three months (Table 1). Has achieved average Visual Analogue scale of 3.37 after enrollment of three months & achieved average oxford knee score of 40.20 after enrollment of three months (Table 2). Has achieved average Visual Analogue scale of 2.27 after enrollment of three months and achieved average oxford knee score of 42.10 after enrollment of three months (Table 3).

Table 1: Group A- patients receiving multivitamins with exercises.

Group- A	Group- A			At the time of enrollment			At 6 weeks			At 3 months		
	Group of patients	Average Age/ sex	Clinical features	Visual analogue scale	Oxford knee score	Clinical features	Visual analogue scale	Oxford knee score	Clinical features	Visual analogue scale	Oxford knee score	
Average results	30	36.87	Pain, swelling, stiffness at different body Parts/joints	7.93	15.50	Pain, swelling, stiffness at different body Parts/ joints	6.80	17.10	Pain, swelling, stiffness at different body Parts/ joints	5.63	19.80	

Table 2: Group B- patients receiving nsaids only.

Group- A	p- A At the time of enrollment			At 6 weeks				At 3 mont			
	Group of patients	Average Age/ sex	Clinical features	Visual analogue scale	Oxford knee score	Clinical features	Visual analogue scale	Oxford knee score	Clinical features	Visual analogue scale	Oxford knee score
Average results	30	37.47	Pain, swelling, stiffness at different body Parts/joints	5.57	26.13	Mild pain, swelling, stiffness at different body Parts/ joints	4.33	35.90	Mild pain and stiffness at different body Parts/ joints	3.37	40.20

Table 3: Group C- patients receiving avocado oil with exercises.

Group- A			At the time of enrollment			At 6 weeks			At 3 months		
	Group of patients	Average Age/ sex	Clinical features	Visual analogue scale	Oxford knee score	Clinical features	Visual analogue scale	Oxford knee score	Clinical features	Visual analogue scale	Oxford knee score
Average results	30	35.10	Pain, swelling, stiffness at different body Parts/joints	5.40	27.03	Mild pain, swellin at different body Parts/ joints	3.83	33.43	No any complai n at different body Parts/ joints	2.27	42.10

DISCUSSION

The Oxford Knee Score (OKS) is a patient reported outcome questionnaire that was developed to specifically assess the patient's perspective of outcome following Total Knee Arthroplasty. The OKS has subsequently been validated for use in assessing other non-surgical therapies applied to those suffering from issues with the knee. The OKS consist of twelve questions covering function and pain associated with the knee. The benefit to this questionnaire is that it is short, practical, reliable, valid and sensitive to clinically important changes over time. §

Grading for the Oxford Knee Score

Score 0 to 19 May indicate severe knee arthritis. It is highly likely that you may well require some form of surgical

intervention, contact your family physician for a consult with an Orthopaedic Surgeon.

Score 20 to 29 May indicate moderate to severe knee arthritis. See your family physician for an assessment and x-ray. Consider a consult with an Orthopaedic Surgeon.

Score 30 to 39 May indicate mild to moderate knee arthritis. Consider seeing your family physician for an assessment and possible x-ray. You may benefit from non-surgical treatment, such as exercise, weight loss, and /or anti-inflammatory medication.

Score 40 to 48 May indicate satisfactory joint function. May not require any formal treatment.

Analogue Scale (VAS) is a measurement instrument that tries to measure a characteristic or attitude that is believed to range across a continuum of values and cannot easily be directly measured. For example, the amount of pain that a patient feels ranges across a continuum from none to an extreme amount of pain.

VAS [Visual Analogue Scale] can be presented in a number of ways, including

- Scales with a middle point, graduations or numbers (numerical rating scales),
- Meter-shaped scales (curvilinear analogue scales),
- "Box-scales" consisting of circles equidistant from each other (one of which the subject has to mark), and
- Scales with descriptive terms at intervals along a line (graphic rating scales or Likert scales).10 The VAS score is determined by measuring in millimetres from the left hand end of the line to the point that the patient marks.

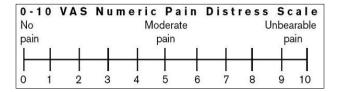


Figure 1: Example of VAS.

Avocado oil is an edible oil pressed from the fruit of the Perseaamericana (avocado). As a food oil, it is used as an ingredient in other dishes, and as a cooking oil. It is also used for lubrication and in cosmetics, where it is valued for its supposed regenerative and moisturizing properties. It is high in monounsaturated fats and vitamin E, and also enhances the absorption of carotenoids and other nutrients.¹¹ Avocado belongs to the flowering plant family Lauracaea.12 Initially avocado was considered as a vegetable but later it was cleared that it's a 'pear shaped' or 'egg-shaped' fruit with dry green skin and fleshy body inside. They are mostly cultivated in tropical and temperate climates such as in California. Avocados are rich in vitamins, fibre, protein and fat content that plays important role in controlling number of ailments such as it reduces the risk of arthritis, diabetes, stroke and coronary artery disease, helps in lowering cholesterol level, promote healthy body weight and helps in preventing the development of certain types of cancer hence considered as one of the "super food". Avocado plays important role in decreasing this oxidative and inflammatory stress due to the presence of large number of xanthophyll carotenoids such as lutein and zeaxanthin which are rich in anti-oxidant properties. Extracts of avocado (300mg) was found to have significant decrease in pain and joint improvement in those suffering from osteoarthritis of knee and hip. They also have ability to decrease pro-inflammatory mediators such as interleukins, prostaglandins, reduce the production of degradative enzymes. Avocados also contain phytosterols and carotenoids, such as lutein and zeaxanthin. 13 Avocado

stimulates the synthesis of collagen and aggrecan by inhibiting inflammatory cytokines such as IL-1, IL-6, IL-8, TNF, and PGE2 through modulation of NF-kappaB. 14 In vitro studies show that Avocado oil inhibits fibrinolysis by stimulating the expression of plasminogen activator inhibitor (PAI-1).15 PAI-1 inhibits tissue plasminogen activator and urokinase (uPA), thereby blocking plasminogen activation and inhibiting fibrinolysis (the physiological breakdown of blood clots). This fibrinolytic and tissue destructive proteinase cascade may play a role in OA joint inflammation via altered expression of uPA receptors. 16 Avocado acts as an anabolic agent in vitro, reducing the production of pro-inflammatory mediators, including IL-1, IL-6, IL-8, macrophage inflammatory protein-1, NO, MMP-13, TNF-α, and COX2/PGE217. Avocado oil does not possess any side effects at therapeutic dose so safety profile of Avocado is much better than NSAIDS.

Table 4: Nutrient facts of avocado.

Nutrients	Per 100 ml					
Energy	3350 kJ (801 Cal)					
Protein	0 g					
Fat Total	90 g					
Saturated	13 g					
Trans fat	0 g					
Polyunsaturated fat	8g					
Monounsaturated fat	69g					
Cholesterol	0 mg					
Total Carbohydrate	0 g					
Sugars	0 g					
Dietary Fiber	0 g					
Sodium	5 mg (max)					
Vitamin E	12 mg					
Beta Sitosterol	487 mg					

As the study was for a short duration a better assessment can be derived if the same study can do for a longer period of time.

CONCLUSION

Avocado has good control over pain threshold, joint stiffness and swelling. Avocado is showing better oxford knee score & visual analogue score in comparison to NSAIDS. Avocado oil is a food supplement and does not contain any significant side effects in comparison to NSAIDS [Non-steroidal anti inflammatory drugs], glucosamine sulfate, chondroitin sulfate, sulfasalazineetc, so avocado oil can be used in long duration of treatment in case of osteoarthritis. Avocado oil can be used in place of other chondroprotective drugs like glucosamine sulfate, chondroitin sulfate, sulfasalazineetc, in the treatment of osteoarthritis. Osteoarthritis inflicts pain and physical limitation on millions of people. Improving joint function and patient activity is a central public health concern to improve quality and length of life. The aim is not only to

treat pain but also to prevent the onset of disease. Avocado may prove to be an effective treatment option for symptomatic osteoarthritis, as they have been shown to possess chondroprotective, anabolic, and anticatabolic properties, as well as anti-inflammatory properties. At the clinical level, Avocado reduce pain and stiffness while improving joint function.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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