

## The role of Yoga and Naturopathy in the Management of Anterior Cruciate Ligament Tear in Obese Patient- A Case Report

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### ABSTRACT:

The anterior cruciate ligament (ACL) rupture is one of the most prevalent knee injuries. ACL tears account for up to 64% of athletic knee injuries in cutting and pivoting sports, resulting in 120,000-200,000 ACL reconstructions (ACLRs) performed annually in the United States alone, at a cost of over 1.7 billion US dollars. Regardless of treatment, many persons with ACL injuries have poor long-term prognosis. ACL injuries frequently cause joint effusion, altered knee Kinematics and gait, muscular weakness, and decreased functional performance. A 25-year-old female obese patient with the obesity BMI of 47.7 kg/m<sup>2</sup> and a tear in her anterior cruciate ligament was hospitalised to our hospital for three weeks of integrated yoga and naturopathic care. Before and after therapy, the WOMAC score, 10 metre walk test, and perceived stress scale score were all evaluated. After three weeks of therapy, the patient improved in all factors examined. And the current study's findings indicate that a Yoga and Naturopathy method is an effective management in the rehabilitation of an anterior cruciate ligament tear in an obese patient.

**KEYWORDS:** ACL Tear, Obesity, Yoga & Naturopathy.

Received: 21.11.2023 Revised: 06.12.2023 Accepted: 22.12.2023 Published: 26.12.2023

Quick Response code



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### INTRODUCTION:

The anterior cruciate ligament (ACL) has long been thought to be the primary passive restriction on tibial anterior translation with regard to the femur. Because of its unique position, the ACL contributes to knee rotational stability in both the frontal and transverse planes. <sup>[1]</sup> The anterior cruciate ligament (ACL) rupture is one of the most prevalent knee injuries. ACL rupture is a significant knee injury with a high risk of

dynamic instability, associated lesions, and early post-traumatic osteoarthritis <sup>[2]</sup>. Regardless of treatment, many persons with ACL injuries have poor long-term prognosis. Poor outcomes include episodes of giving way, limits in sport and activity, and ACL graft rupture, as well as future meniscal injuries, persistent pain, early onset of knee osteoarthritis, and poor long-term quality of life (QOL) <sup>[3]</sup>. In the young active population, acute anterior cruciate ligament rupture is a

common and devastating knee injury [4]. ACL tears account for up to 64% of athletic knee injuries in cutting and pivoting sports, resulting in 120,000-200,000 ACL reconstructions (ACLRs) performed annually in the United States alone, at a cost of over 1.7 billion US dollars. ACL injuries frequently cause joint effusion, abnormal knee kinematics and motion, muscular weakness, and decreased functional performance [5].

The risk of arthritis is higher in patients with a BMI of more than 25 kg/m<sup>2</sup> due to increased stresses across the knee joint. Furthermore, an increased BMI has been linked to an increased likelihood of simultaneous medial meniscus tears and articular cartilage abnormalities discovered after ACL restoration [6]. It is likely that spontaneous repair of an ACL rupture can lead to better patient outcomes (such as less pain, greater stability and function, fewer activity limits, higher QOL, and a lower prevalence of osteoarthritis). The likelihood of ACL recovery with non-surgical treatment, however, is unknown, as is the link between ACL healing and patient outcomes [3,4].

Yoga and Naturopathy is a drug-free medical system that employs non-invasive techniques of interventions to create an environment that is conducive to the body's healing. It advocates the inherent healing power of nature [7]. It is effective in the management of various diseases, which is safe and reported to have no adverse effects [8]. Therefore, this case report aimed to examine the effect of integrated yoga and naturopathy in the management of ACL Tear in obese patient.

#### **CASE REPORT:**

A 25 years old female patient, a housewife was suffering from a knee joint ligament tear for past 5 months. She came to our inpatient

department of Government yoga and naturopathy medical college and hospital, Arumbakkam on august 29, 2022 with a complaint of gradual increase in body weight since childhood and progressively increased after delivery of her first baby and she had knee joint pain in both knees and ankles with occasional edema which is non pitting in nature after accidental fall from bike in road side before 5 months. Her pain was aggravated by the strain and prolonged standing. Magnetic resonance imaging (MRI) results stated a diagnosis of a left knee with complete rupture of the left ACL, bone marrow contusion, sprain including MCL medial patellar retinaculum and right knee with laxity of infrapatellar tendon, degenerative changes in posterior body of medial meniscus.

Lachman Test positive and found to be grade-3. Her blood pressure was 134/84 mmHg, her pulse rate was 84 bpm, her temperature was afebrile and her BMI was 47.7 kg/m<sup>2</sup> at the time of admission. The same patient consulted an allopathic doctor and he prescribed analgesics for pain, diuretics for edema, lipase inhibitors for weight loss, and advised some exercises. After one year again patient started getting a similar kind of pain and associated swelling occasionally so she was advised to take a surgery option. So, to avoid surgery the patient got admitted to inpatient department of GYNMC&H, Chennai; with the written informed consent from the patient.

#### **DIAGNOSTIC ASSESSMENT:**

- Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC):

The WOMAC Osteoarthritis Index is a reliable, valid, and sensitive self-report questionnaire used to measure symptoms of hip and knee osteoarthritis. It has five response levels representing different

intensity levels and scores from 0 to 96. An improvement in function is achieved by reducing the overall score. Scores range from 0 to 96 for the total WOMAC where 0 represents the best health status and 96 the worst possible status [9].

- Perceived Stress Scale:

It is a 10-item self-report instrument measuring global felt scale measures perceived stress, ranges from 0 to 40, with higher scores indicating greater stress levels. Higher subscale scores indicate stronger negative distress/stress feelings and stronger positive stress sensations and coping capacities, determined by adding negatively worded items for Factor 1 and positively worded items for Factor 2 respectively [10].

- Visual Analog Scale:

It was used to evaluate the patient's overall pain intensity of all the joints on scale of 0-10, where 0 indicate no pain and 10 indicate worst pain. Patient was asked to mark a point on the scale to indicate his pain intensity [11].

- 10-Meter Walk Test:

The 10-meter walk test is a measurement to determine walking speed in meters per second.

Ask the patient to walk 10 meters in a clear path. Time will be kept by a stopwatch

starting at 2 meters and going up to 8 meters. The result will be noted in the unit of meters per second [12].

The detail of the outcome measures given to the subject is provided in table 4.

### THERAPEUTIC INTERVENTION:

An Integrated Yoga and Naturopathy intervention has been given for a period of 3 weeks. The details of the yoga and Naturopathy intervention are provided to the patient are given in Table 1, 2 and 3.

### RESULTS AND OUTCOME:

After 3 weeks of yoga and naturopathy intervention, the patients showed significant improvement in WOMAC score, perceived stress scale, 10 meter walk test and significant reduction in body mass index and VAS pain score.

### FOLLOW UP:

To further understand the long-term advantages of yoga and naturopathy interventions in ACL Tear in obese patient, we intend to continue monitoring the patient. After three months of monitoring, the patient reported no reoccurrence of symptoms.

**Table- 1: A detail of naturopathy intervention:**

Naturopathic intervention;	Morning (10.30am – 12 pm)	Afternoon (3.30pm – 5 pm)
Hydrotherapy & Mud therapy: Cold compress to both knees Mud application to both knees	20 mins (daily) 20 mins (alternate days)	- -
Electrotherapy: Wax compress to both knees TENS to both knees	- 15mins (alternate days)	10 mins (Alternate days) -
Magneto therapy: Magnet knee belt to both knees	10 mins (daily)	-

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Massage: Full body massage with steam bath Derivative massage to both legs	45 mins + 10 mins (weekly once) 15 mins (Alternate days)	- -
Heliotherapy: Plantain leaf bath full body	30 mins (weekly once)	-
Acupuncture: UB-60, CV-3, 2, ST-25, SP-15, H-8, LU-9, 10, LI-4.	- -	20 mins (daily for 10days) 5 mins (every day)
Reflexology to both sole		

**Table -2: Yoga intervention:**

Name of the practices	Details	Duration
Loosening exercises	Pawanamuktasana series-1	10 mins (every day – 5 rounds each)
Asanas - dc (done by sitting in chair)	Ardha chakrasana (dc) Ardha katichakrasana (dc) Katichakrasana (dc) Naukasanchalanasana(without strain) Ardha uttanpadasana (Supine)	15 mins (each asana -3 rounds)
Breathing exercise	Hands in and out breathing (dc) Hands stretch breathing (dc) Janu falak akarshan breathing Ankle stretch breathing (without strain) Sectional breathing (supine)	5 mins (10 rounds each) 2 mins
Pranayama	Nadi shodana pranayama (dc) Brahmari pranayama (dc) Suryabhedana pranayama (dc)	10 mins (10 rounds each)
Relaxation techniques	Deep relaxation technique/ Yoga Nidra (supine)	20 mins (one practice each day)
Meditation	AUM Chanting meditation (supine)	5 mins (alternate days)

**Table- 3: Menu plan, timing and quantity of plant based raw diet:**

Timing	Plant based raw diet	Quantity
6.30am– 7.00am	Vegetable juice (Bottle gourd/ plantain pith / bitter gourd / curry leaves, coriander and mint (CCM)/ ash gourd)	200 ml

8.30am - 9.00 am	Sprouts (green gram/ pearl millet), Vegetable salad (cucumber/ beetroot, carrot/ tomato/bottle gourd).	25 grams 200 grams
11.00am - 11.30 am	Vegetable/ Fruit juice (papaya/ grape/ lemon and mint/ tomato and mint/ watermelon/ beetroot)	200 ml
1.00pm - 1.30 pm	Sprouts (green gram and groundnut) and fruit salad	50 grams 200 grams
4.00pm - 4.30pm	Vegetable/ fruit juice (grape/ amla/ carrot/ watermelon/ lemon/ CCM)	200 ml
7.00pm - 7.30 pm	Fruits salad (papaya/ watermelon/ muskmelon/ guava/ mosambi)	200 grams

**Table 4: Changes in the variables after the intervention:**

Variables		Before treatment	After treatment
Height (cm)		168	168
Weight (kg)		134.5	127.5
BMI (kg/m <sup>2</sup> )		47.7	45.5
WOMAC Score	Pain	18	3
	Physical function	60	6
VAS Score		10	2
10 meters walk test	Self-velocity	3.24 m/s	1.13 m/s
	Fast velocity	2.92 m/s	0.9m/s
PSS score		24	6

**BMI:** Body mass index; **WOMAC:** Western Ontario and McMaster Universities Osteoarthritis Index; **VAS:** Visual Analog Scale; **PSS:** Perceived Stress Scale.

## DISCUSSION:

In accordance with the trial's outcomes, integrated Yoga and Naturopathy therapies significantly improved the WOMAC score, VAS Pain score, 10 Metre walk test, and Perceived stress scale score in patients with ACL tears. Previous study revealed that yoga and naturopathic therapy for acute inflammatory illnesses such as ACL tear and osteoarthritis are effective and beneficial.

In a study Deepeshwar S et al. found that yoga therapy significantly reduced knee pain and stiffness, improved mobility, increased

cartilage proteoglycan content, and slowed cartilage degeneration in osteoarthritis patients. Furthermore, yoga helps to revitalise the neurological system, lubricate the joints, muscles, and ligaments to avoid synovial fluid volume decline, and strengthens quadriceps and hamstrings, which helps to stabilise the knee joint, resulting in improved range of motion, WOMAC Score, and lower levels of pain [13]. Acupuncture has been shown to reduce inflammation by modulating the expression of interleukin-1, tumour necrosis factor,

matrix metalloproteinase, and tissue inhibitor. It may also help to speed up cartilage regeneration by modifying the synthesis of transforming growth factor 1 and basic fibroblast growth factor, which helps to reduce inflammation, promote faster healing, and increase immunological tolerance to stressors [14]. According to a case indicate investigation, massage therapy was effective in reducing pain and the degree of hamstring flexion contracture during each session, whereas lymphatic drainage techniques significantly reduced post-surgical inflammation and knee and distal thigh circumference measurements, which is beneficial in reducing pain, edema, strain, and weight [15].

Transcutaneous electrical nerve stimulation was a successful and non-invasive pain therapy. It works by inhibiting the physiological activity of nociceptive projection neurons via the gate control hypothesis of pain, which serves to lessen pain and promote comfort [16]. Cryotherapy, a method of applying cold to the skin surrounding injured soft tissues, has been shown to reduce pain by reducing cell necrosis and pressure on pain receptors, and decrease swelling by reducing temperature and blood flow through vasoconstriction, which reduces the permeability of cellulite, cellular diffusion, and neutrophil migration, and nerve signal conduction and transmission [17]. Cold compresses applied to the knee joint have been demonstrated to widen blood vessels, restore blood flow, promote endorphin and enkephalin release, and reduce pain by blocking the transfer of pain stimuli, all of which contribute to the relief of pain, erythema, edema, and localised inflammatory reaction [18].

Previous research by several authors used wax therapy and mobilisation techniques as a treatment option in arthritic individuals. All of these trials concluded that

mobilization techniques and wax baths are effective treatments for tight joints and provide rapid pain alleviation. The paraffin wax bath is commonly used as effective remedy to improve circulation and promotes relaxation [19]. A steam bath is a way to expose the patient to moist heat, which has been shown to lower lipid levels, average weight, waist-hip ratio and BMI by activating lipolysis and inducing thermal stress and endocrine changes through stimulation of sympathetic nervous system and secretions of catecholamines and glucagon which helps to reduce lipid levels and anthropometric measurements in our patient [20].

It is probable that the integrated approach of yoga and naturopathy therapies enabled to the patient's overall well-being by improving physical function, reducing symptoms such as pain, discomfort, erythema, and enhancing range of motion, edema, and stress in an obese patient with an anterior cruciate ligament tear.

### **CONCLUSION:**

The findings indicate that yoga and naturopathic therapies are successful in obese patients with ACL Tears, actively reducing weight, discomfort, edema and improved range of motion in the injured knee. However, additional clinical investigations are necessary to corroborate the study's findings.

### **The strength of the study:**

No adverse effects were reported by the subject. It is feasible, and safe for the patient, and the patient was comfortable with the treatment.

### **Limitations of the study:**

The results may vary because of a single case study. Hence, further well-planned clinical



studies are suggested with a large sample size to validate our results.

**Declaration of the patient:**

The authors confirm that consent was obtained by providing clear instructions about the patient's participation in this clinical observation. The baseline and post data were collected for future reference, and the participant also agreed to have her case history and/or other details published in a journal, with the condition that her name or initials would not be used.

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**Conflict of interest:** The author declares that there is no conflict of interest.

**Guarantor:** The corresponding author is the guarantor of this article and its contents.

**Source of Support:** None

**How to cite this article:**

Indiradevi S, Vijay A, Prashanth S. The role of Yoga and Naturopathy in the Management of Anterior Cruciate Ligament Tear in Obese Patient- A Case Report. *Int. J. AYUSH CaRe*. 2023;7(4):523-530.