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## Case study report on an obese subject with bilateral osteoarthritis knee joints using alignment correction exercises

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### Abstract

This case study of a female subject treated for obesity and pain in both the knees with 3 months of regular physiotherapy with main focus on alignment correction exercises has shown reasonable results. A reduction in obesity, cadence, VAS scale and physical function as evidenced with womac score were recorded.

**Keywords:** OA, Osteoarthritis, BMI, Body Mass Index, VAS, Visual Analogue Scale, Womac Score, Subjective Rating Score on a, 5 Point Scale on Various Functional Activities with Reference to Knee Joint

### Introduction

Osteoarthritis is a clinical syndrome of joint pain and dysfunction caused by joint degeneration and affects more people than any other joint disease (Brooks et al 2002) with nearly 10% of the population is affected globally and the prevalence increases with age (King et al 2013). Obesity is the greatest modifiable risk factor for Osteoarthritis (Szoke et al 2006). Osteoarthritis in varying severity from mild to severe, exercise therapy is regarded as the corner stone of conservative management for the disease (Anando et al 2008). Exercises can improve physiological impairments associated with Osteoarthritis including muscle strength, joint range of motion, proprioception, balance, improved mobility, falls risk, body weight, psychological state on pain and function (Anando et al 2012)

### Aims & Objective of the study was

1. To analyse the effect of exercises on obesity
2. Efficacy of alignment correction exercises to lower extremities
3. Effects of strengthening exercises on pain and quality of life

### Background Information:

55 year old female with complaints of difficulty in walking for long distance, pain in both knees and occasional low back pain, past medical history of the subject was a post graduate in science, serving as a teacher with more than 25 years of experience, endomorph, vegetarian, mother of two children, non-hypertensive / non diabetic. Present medical condition with complaints of pain in the knees were of post-menopausal origin since two years

### Anthropometric Measurements:

Height: 152 cm                      Heart Rate: 84 / mt                      Weight: 83 Kg  
Blood Pressure: 136/84 mm/Hg                      Waist Circumference: 111Cm                      BMI: 45 Kg/m<sup>2</sup>

### O/b

- Ambulant with antalgic gait with lumbar list to right side
- Medial joint line tenderness positive and abduction test positive on left knee

### O/E

- Left knee mild pre patellar effusion
- Increased laxity of left knee

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- Bilateral Vastus Medialis lag positive
- Exaggerated lumbar lordosis
- Isometric motor power of abdominal and spinal muscles III / IV
- Both hip flexors 3/5, both quadriceps and hamstrings 3/5
- Both hip abductors and extensors 3/5
- Moderate exercise tolerance
- Active range of motion of left knee in prone 0<sup>0</sup>-110<sup>0</sup>, Right 0<sup>0</sup>-120<sup>0</sup>
- Pain increases during movements of left knee while standing and walking
- Independent for daily activities but with pain and difficulty
- Standing X- ray revealed: Decreased medial joint space on left knee
- Provisional Diagnosis: Obesity, early osteoarthritis of both knee joints

**Treatment Adopted**

- a. Weight reduction with resisted exercises using Physioball in supine, side, prone and sitting.
- b. Strengthening of bilateral core, hip and knee joint muscles.
- c. Promote lower extremity alignment exercises.

**Frequency:** Twice a week,

**Duration:** 3 Months, each session with a set of 10 exercises, progressed with increased number of repetition each week

**Results**

**Table 1:** The subjects of Pre and Post Exercises on BMI, Waist Circumference, Womac, VAS Scale and Cadence

	BMI kg/m <sup>2</sup>	Waist Circumference Cm	Womac Score %	VAS Scale	Cadence / Minute
<b>Pre</b>	45	111 Cm	65%	8	20
<b>Post</b>	40	100	20%	3	35

**Discussion**

The major outcome of this case study as displayed in the pre and post results in the above table, were due to:

1. Reduction in obesity
2. Strengthening exercises on pain and quality of life
3. Alignment correction exercises on laxity of knee joint

**The possible mechanisms with supportive evidences getting discussed as below**

1. Exercises combined with weight loss appears to be more effective than either intervention alone (Messier etal 2004 & Coggon etal 2001) reported that subjects with a BMI> 30kg/m<sup>2</sup> were 6.8 times more likely to develop osteoarthritis. Obesity related osteoarthritis where structural joint damage is thought to result from both mechanical factors including increased forces about the joint, decreased muscle strength and altered biomechanics during every day activities (King etal 2008). Christenson etal 2007 in a meta analysis involving 454 overweight patients with osteoarthritis knee found that weight loss resulted in significant reduction in physical disability. Which coincides with findings of this case study subject with a weight loss of

BMI by 5 kg / m<sup>2</sup> has recorded an improved VAS scale and womac score as shown in the results table.

2. A meta-analysis showed moderate treatment benefits for pain and physical function (Fransen & MC Connel etal 2008) while these effects are similar to those effects achieved from simple analgesia and non-steroidal anti-inflammatory drugs but with much fewer side effects (Zhang etal 2009)
3. Knee adduction moment may be an important mechanical variable associated with the development of knee osteoarthritis (Brouwer etal 2007) and people with obesity have greater absolute knee abduction moments due to increased body mass and engage in compensatory gait patterns such as slower walking velocity and increased toe out angle (Segal etal 2009). Increased dynamic loads on the medial compartment of the knee may contribute to the progression of knee osteoarthritis, as increased load on the articular cartilage is one factor associated with the pathogenesis of osteoarthritis (Radin etal 1991). It has been suggested that increasing toe out angle during gait is a mechanism for decreasing the knee adduction moment (Wang etal 1990)

Studies have characterised the dynamic knee joint loads using the external knee adduction moment (Wang etal 1990) and a greater adduction moment corresponds to an increased load on the medial compartment relative to that of the lateral compartment (Schipplein & Andriacchi etal 1991). subjects with osteoarthritis knee with medial joint space narrowing have been shown to have greater than normal peak knee adduction moments (Baliunas etal 2000) and among surgical outcome with pain relief (Hurwitz etal 2000) are related to external knee adduction moment.

The alignment correction exercises for lower extremities in supine, Prone and Sitting. Along with these core strengthening and plank exercises in supine, side and prone forms the alignment correction exercises though requires a minimum of 21 sessions in this subject, could vary with individuals, and requires more scientific validity on larger sample size and radiological means as evidence for correction of alignment achieved, but sustained effort with care on weight, life style modification and home exercises are to be reiterated.

**Conclusion**

Along with regular physiotherapy when obesity is treated with resisted exercises using Physioball was effective among obese subjects with osteoarthritis knee. The major or outcome of this study when the above said measures to be combined with alignment correction exercises an enhanced faster rehabilitation on the subjects daily physical functioning was proved. However larger sample sizes, long duration of follow up are recommended with other measurable variables such as radiological, biomarkers, biomechanical items could be carried in future studies. Limitations of this case study was no specific biomechanical parameter were used as a tool of measurement

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