Impact of Core Exercises and Alignment Correction Exercises of Bilateral Osteoarthritis Knee on an Octogenarian Subject – Evidenced Study

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Abstract:

Introduction: *An increasing elderly population and longevity is associated with health issues, mainly musculoskeletal ailments, among which osteoarthritis knee was mostly recorded. These degenerative joints can lead to pain, disability and dependency.* ***Aims & Objectives of this Original Research:*** *was to evaluate specific core exercises and alignment correction exercises on obesity and physical functioning on a subject with bilateral osteoarthritis knees study conducted in Chennai, south India.* ***Materials & Methodology:*** *This case study subject aged 87 years with osteoarthritis knee grade was treated with specific core strengthening and alignment correction exercises during the period from 02.01.2017 to 20.06.2017 with weekly twice frequency.* ***Results:*** *A reduction in BMI (P<.05) and womac score (P<.05) with significant statistical analysis.* ***Conclusion:*** *Subjects irrespective of age with musculoskeletal disorders including osteoarthritis of knee will benefit from specific exercises such as core strengthening, weight reduction means and alignment correction exercises as evidenced in this original case study*

Keywords:*BMI – Body Mass Index, WC – Waist Circumference, VAS – Visual Analogue Scale, Womac – Subject Rating Scale on Knee Functions on 17 Items on a 5 Point Scale, OA – Osteoarthritis*

Introduction:

Osteoarthritis (OA) is a clinical syndrome of joint pain and dysfunction caused by joint degeneration and affects more people than any other joint disease. The burden due to osteoarthritis knee is anticipated further increase due to obesity and an ageing population (Vos etal 2010). But the underlying pathogenic mechanisms are not fully understood, with management mostly depends on symptoms state and use of non-pharmacological and pharmacological therapy , with joint replacement as the treatment endpoint (Nelson etal 2013) strong evidence for exercises and weight loss for the management of osteoarthritis (Svege etal 2013). Obesity is the greatest modifiable risk factor for osteoarthritis and subjects with a BMI >30kg/m2 were 6.8 times more likely to develop knee osteoarthritis than normal weight controls (Coggan etal 2001) osteoarthritis affects all aspects of life through pain and limitation of mobility (Laurenk. king etal 2008) and economic burden of OA knee was high in UK & US especially when associated with obesity (Anando 2012). Nearly 10% of the global populations were affected and the prevalence increases with age (Brooks etal 2002). Although any joint in the body can be affected by OA, the knee joint is more commonly involved especially in India (Arya etal 2013). ACSM 2009 on exercise and physical activity for older adults has emphasized the importance of exercising throughout life, with regular aerobic, resistance, balance and stretching. Exercises training programmes improve the muscle strength (ciolac etal 2010) and resistance training has been shown to significantly increase skeletal muscle mass and strength in the elderly(Mangione etal 2010) an increased physical activities is associated with improved health outcomes(sing etal 2001) and daily living activities of elderly people even those in their 80s or 90s(Binder etal 2002)

Aims & Objectives of this study were to

I. To improve core muscles and find their out come
II. To improve alignment correction and analyse knee joints functional outcome with womac score
III. To evaluate reduction of pain and confidence with his daily activities.

Materials & methodology:

Background Information:

1. 87 year old retired gazette officer from a nationalized bank in India. Vegetarian, Nonalcoholic, ambulant with a stick with past medical H/O TURP in 2010 (Transurethral Prostate Resection) complaints of pain in knees and difficulty in walking and he wish to avoid falls and TKA as adviced by the orthopaedic surgeon (Total Knee Arthroplasty).
2. With bilateral genu varum and severe degeneration of both knee joints, with orthopaedic advice to undergo TKA was treated for six months duration with non pharmacological means of specific exercises in this study.

Resting Heart Rate: 78 /minute Height: 172 Cm weight: 73 Kg

Waist Circumference: 99 cm

O/E

Mild urinary urge incontinence, exaggerated lumbar lordosis, abdominal muscle III / V

−Balance in standing – moderate but long standing increases pain

−Walks unaided in closed environment for few minutes, ambulant with antalgic gait using and a quadripod for walking in open environment

−Right shoulder degenerative changes with restricted movements above 90^0

−Vision, Hearing, cognition good

− Knee	ROM	Left	Right
		Side 10-100	0-110
		Sitting 110	120

−Bilateral Vastus Medialis lag was positive

- Standing X ray AP and lateral views of both knee joints reveals no joint space of bilateral tibiofemoral narrowed. Bilateral grade III OA changes, generalized osteopenia.

−ADL and self-care – independent but for select activities requires assistance and monitoring.

Treatment Adopted:

This research was conducted from 02.01.2017 to 20.06.2017 at Chennai. With a frequency of twice a week and each session lasts for 25-30 minutes. Subjects consent was obtained with due explanation of the procedures to be performed. Specific core exercises in sitting, supine lying, side lying and half lying with Physioball were carried out. Also alignment correction exercises were done using pillows. Including keagles exercises a set of exercises he was told to perform as home exercises. Each exercise were repeated with more number of times every week.

Alignment Correction Exercises in Supine & Prone Position with Pillow

Core Exercises Using Physioball

Results:

Subjects heart rate, physical signs were monitored with respect to his age, no untoward fall, over exhaustion, increase in pain were recorded during treatment periods. BMI, waist circumference, VAS of the subject were recorded at the beginning and end of the study and analyzed scientifically with evidence as below:

Table on results of pre and post, womac, VAS scale, BMI and WC

Test	Womac %	VAS	BMI Kg/m^2	WC cm
Pre	58	7	31	99
Post	33 (Decreased by 41.7%)	4 (Decreased by 42%)	28 (Decreased by %)	92 (Decreased by 7.7%)
SD	17.67	2.12	2.12	4.95
SE	10.20	1.22	1.22	2.86
t	2.45	3.27	2.45	2.45
P	<.05	<.05	<.05	<.05

SD – Standard Deviation, SE – Standard Error, P – Level of Significance,

VAS – Visual Analogue Scale on Pain, P<.05 – Statistically Significant Results

This research was conducted during the period from 02.01.2017 to 20.06.2017.

Major findings of this study where a drop in obesity by 9.6% and an improved womac by 41.7% with an improved physical functioning and good quality of life. Also statistically significant (P<.05) results on womac, VAS, BMI and WC as displayed in the above table displaying on pre and post statistical analysis on the above said parameters of this study subject

Results based on Clinical Prognosis with Treatment:

- Subject has started walking unaided (he was using a stick earlier) for 10-15 minutes daily unaided.
- Social activities have increased than earlier
- With reduction of pain and improved joint motilities of lower extremities his self-care for ADL, ambulation has increased
- Also his continence of the bladder with prostate ailment has improved with decrease in post-void residual urine

Discussion:

1. Age associated sacropenia with loss of muscle, strength, power and endurance with reduced capacity to perform daily living activities (Fintarone 2002). Hence strength training is important to minimize loss of muscle mass that would otherwise exacerbate muscle weakness (Toda 2001). The quadriceps, hip abductors, hip extensors, hamstrings and calf muscles are important for function and should be targeted, along with stretching, promote range of motion and balance based on specific individual assessment (Ben etal 2004)
2. (Jiang etal 2011) have reported with clinical and radiological evidence a dose-dependent relationship between BMI and risk of osteoarthritis knee, and further recorded that a 5 unit increase in BMI was associated with a 35% increased risk for osteoarthritis knee. (Christensen etal 2007) among 454 obese subjects with knee osteoarthritis found weight loss resulting in significant reduction in physical disability. (Pilletier 2007) have recorded using MRI in a two year follow up among osteoarthritis knee subjects that BMI was one of the strongest predictors of cartilage loss from the central area of the medial tibial plateau and medial femoral condyle, regions with the greatest loss at 24 months. Moderate (9%) weight loss among osteoarthritis knee subjects can improve cartilage quality and quantity (Anando 2012).**obesity reduction by lowering of BMI by 9.6% and waist circumference by 7.7% and statistically significant as displayed in table of results of this subject with benefits on improvements in cartilage as perceived by the subject with decreased noise on knee movements and improved physical activities also recorded by the author.**
3. **An improved functional activities of this study subject with an improved womac score by 41.7% with statistically significant as shown in the results table following in 6 months period has added up confidence in the subject with increased social activities, improved regular walking and independence for his ADL which was another key outcome component of this research report.**
4. Core strengthening forms the strong basis of human movement, prevents injury, improve posture, balance and peripheral mobility (Vern Gambelta 2002 & Martuscello 2013) in his systematic review have reported ball exercises were superior to traditional core stability exercises. Takashi 2007 have described Physioball exercises to improve neuro muscular control including joint stability, balance and proprioception. Core strengthening exercises which were used on this subject using Physioball was gradually increased with repetitions and muscle work, author wish to recorded that despite at this age, he was able to perform exercises without exacerbating physical signs and degenerative osteoarthritis knee changes. Also the results were convincing clinically and with subjective functions.
5. **Alignment Exercises:** Sharma etal 2003 have recorded increased risk of disease progression in association with knee malaignment or laxity. Anando etal 2012 have recorded moderate weight loss in obese subject's results in structure modifying benefits and can improve cartilage quality knee adduction moment may be an important mechanical variable associated with the development of osteoarthritis

knee (Brower 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 decreased toe out angle (Segal etal 2009). Wang etal 1990 have suggested that increasing toe out angle during gait is the mechanism for decreasing knee adduction moment. Also greater adduction moment corresponds to medical joint space narrowing (Baliunos etal 2002). Abnormal leg alignment showed significantly more degenerative changes in the knee (Bobinac 2003)

Conclusion:

Conservative physiotherapy means among elderly population with degenerative knee joints can enhance not only with pain reduction, improved physical activities but decreases dependency and promote self-confidence with dignity was the key outcome with clinical therapy by physical means.

Limitations and Recommendations of this Study:

As case study of a single subject and for 6 months duration, larger sample size of both sex subjects with osteoarthritis knee and longer duration studies with more qualitative variables are highly recommended.

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