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Effectiveness of Tai Chi Exercise on Balance in Elderly Patient with Knee Osteoarthritis

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Abstract: ***The Worldwide prevalence estimate for Knee Osteoarthritis is 9.6% among Men and 18% among Women[1]. In India, the prevalence of Knee Osteoarthritis in Adult Rural population is estimated to be 5.8%[2]. Individuals with painful Knee Osteoarthritis experience difficulty performing basic daily activities such as, performing household chores, stair climbing as well as engaging in social and outdoor activities[3]. Tai Chi has become a popular form of exercise for balance training. Tai Chi is one of the popular form of exercise among older adults and it encompasses balance, aerobics, flexibility and weight bearing exercises with meditation and deep breathing[4-5]. Aim : To study the Effectiveness of Tai Chi exercise on Balance in Elderly patient with Knee Osteoarthritis. Objectives:1) To find the Effectiveness of Tai Chi exercise on Balance in Elderly Patient with Knee Osteoarthritis. 2)To find the Effect of Tai Chi on Pain in Elderly Patient with Knee Osteoarthritis. 3) To find the Effect of Tai Chi on Stiffness in Elderly Patient with Knee Osteoarthritis. 4) To find the Effect of Tai Chi on Physical function in Elderly Patient with Knee Osteoarthritis. Procedure: It was a Randomized Controlled Trial. 50 patients were randomly assigned to the Experimental Group (IFT + Tai Chi) & Control Group (IFT) with 25 patients in each group. The patients were pre- assessed & post –assessed with the WOMAC Index & Berg Balance Scale. Results: The results showed that there was a statistically significant difference in the BBS scale at Baseline & 1 month in the Experimental group. Also there was a statistically significant improvement in the WOMAC Index at Baseline & 1 month in the Control group. Conclusion: Our study concluded that Tai Chi exercises are effective for improving Balance in elderly patients with Knee Osteoarthritis.***

Keywords: Knee Osteoarthritis, Tai Chi, Balance, Elderly Patient

1. Introduction

The Worldwide prevalence estimate for Knee Osteoarthritis is 9.6% among Men and 18% among Women[1]. In India, the prevalence of Knee Osteoarthritis in Adult Rural population is estimated to be 5.8%[2]. It is also more prevalent among those engaged in Agriculture, Manual labour (Men) and household work (Women).

The Knee joint is a complex type of Synovial joint. It has three Compartments: Medial, Lateral and Patellofemoral. Individuals with painful Knee Osteoarthritis experience difficulty performing basic daily activities such as, performing household chores, stair climbing as well as engaging in social and outdoor activities[3].People with higher levels of pain have diminished levels of physical function, a higher functional decline and a decreased Quality of Life[6]. Tai chi, (T.C) invented in China, is a form of exercise that focuses on controlled movements combined with deep diaphragmatic breathing. Yang and Sun styles is being used to improve balance and lower the risk of falls among the elderly population recently. Tai Chi has become a popular form of exercise for balance training. Tai Chi is one of the popular form of exercise among older adults and it encompasses balance, aerobics, flexibility and weight bearing exercises with meditation and deep breathing[4-5].

Balance is a complex function involving numerous Neuromuscular processes[7-9]. Control of balance is dependent upon the sensory input from the vestibular, visual and somatosensory systems.

2. Aim

The Aim of the Study was to study the Effectiveness of Tai Chi exercise on Balance in Elderly Patient with Knee Osteoarthritis.

Objectives

1) To find the Effectiveness of Tai Chi exercise on Balance in Elderly Patient with Knee Osteoarthritis.
2) To find the Effect of Tai Chi on Pain in Elderly Patient with Knee Osteoarthritis.
3) To find the Effect of Tai Chi on Stiffness in Elderly Patient with Knee Osteoarthritis.
4) To find the Effect of Tai Chi on Physical function in Elderly Patient with Knee Osteoarthritis.

3. Materials and Methodology

- Study Design: Randomized Control Trial
- Study Duration: 2 years
- Sampling Method: Simple Random.
- Target Population: Elderly Patients with Knee Osteoarthritis
- Sample Size: 50 samples.

3.1 Eligibility Criteria

Inclusion Criteria

- Men & Women of age group 65-75 yrs.
- Mild to moderate Knee Osteoarthritis (Lequesne score 1 to 7)[10].
- Grade 1 & 2 Osteoarthritis radiologically (According to Kellgren & Lawrence)[10]

- Unilateral Knee Osteoarthritis.
- Mini-mental state examination score ≥ 24.

Exclusion Criteria

- Obesity (BMI ≥30 Kg/m2) [10].
- A Mini mental state examination score of 23 or less[10].
- Exercise induced or Uncontrolled Angina[10].
- A medical condition involving Hip or Knee trauma[10]

3.2 Outcome

- Western Ontario and McMaster Universities Index (WOMAC) [11].
- Berg Balance Scale[12].

4. Procedure

After obtaining the Ethical Committee permission patients were asked to fill the Informed Consent and then the patients were assessed with the help of the Knee assessment Proforma. Then the findings of the patients were confirmed with X-Ray and only those patients with Osteoarthritis grade 1 & 2 according to Kellgren and Lawrence were selected. The selected patients were then randomly assigned into 2 groups consisting of 25 patients in each group: The Experimental Group & the Control Group.

The patients in both the groups were pre & post assessed by using the following Outcome measures.

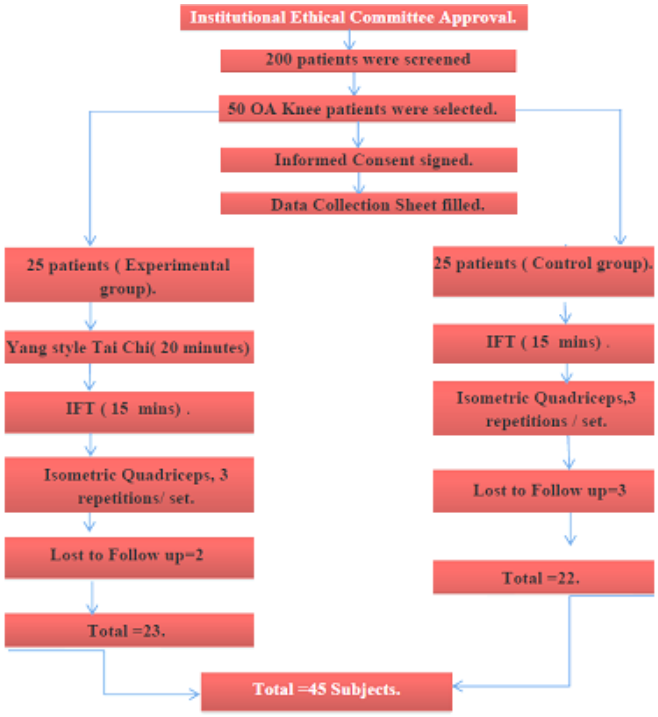
1) Berg balance scale [12].
2) WOMAC Index [11].

Experimental Group

It included the **Yang Style Tai Chi** exercise for 45 minutes per session, consisting of Warm Up exercise for 5 minutes which included the stretching of Hamstrings, Calf and Quadriceps followed by the Yang Style form of Tai Chi exercise for 25 minutes, then reviewing the learnt movements for 10 minutes followed by Cool Down period for 5 minutes which included the stretching of Hamstrings, Calf and Quadriceps. It was given for 5 sessions per week for 2 weeks[10.] **The Interferential Therapy (IFT)** was applied using the Quadripolar method at the Knee joint for 15 minutes at each Knee joint with a frequency of 130 Hz and the intensity according to the patients comfort level. It was given for 5 sessions per week for 2weeks[13].

Isometric Quadriceps exercise: Patient was positioned in long sitting. A roll of bedsheet was put beneath the Knee and the patient was instructed to press the Bedsheet roll down with a hold of 5 seconds and with 3 sets of 10 repetitions each [14].

Control Group: The patients in this group were also given the IFT and Isometric Quadriceps.



5. Data Analysis

Statistical analysis was done using Mann –Whitney test, Wilcoxon test. Software used was SPSS 17 version. $p<0.01$ was considered as level of significance ($p<0.01$).

6. Results

Table 1: Comparison of Berg Balance scale at Baseline and at 1 month in Experimental group

Parameter	At Baseline (n-23)		At 1 month (n=23)		Wilcoxon Z value	P-value	Results
	Mean	SD	Mean	SD			
BBS Score	27.3	5.94	48.65	5.65	4.2	<0.0001	Extremely Significant

Table 2: Comparison of WOMAC Index (Pain, Stiffness & Physical Function) at Baseline and 1 month in Experimental group

Parameter	At Baseline (n-23)		At 1 month (n=23)		Wilcoxon Z value	P-value	Results
	Mean	SD	Mean	SD			
Pain Score	10.96	3.31	4	2.61	4.21	<0.0001	Extremely Significant
Sniffers	3.91	1.70	1.48	0.95	3.94	<0.0001	
Physical function	43.26	9.77	36.57	10.50	3.98	<0.0001	

7. Discussion

The aim of the present study was to find out the Effectiveness of Tai Chi exercise on Balance in Elderly patient with Knee Osteoarthritis. Our study hypothesized that there was a significant effect of Tai Chi exercise on Balance in Elderly patient with Knee Osteoarthritis. In our study we found that there was a more significant improvement in Berg

balance Scale score at baseline & 1 month in the Experimental group(Table 1) Hao Liu [15]& et al, 2010 Their review indicates that TC may be an economic and effective exercise program for improving balance and balance confidence in older adults.

In our study, we found a statistically significant difference in all subscales of WOMAC Index at baseline and 1 month in the Experimental group **(**Table 2), Similarly a study done by Jun-Hong Yan [16]& et al, 2013, Efficacy of Tai Chi on Pain, Stiffness and Function in Patients with Osteoarthritis: A Meta-Analysis. A meta-analysis was done to assess the effectiveness of Tai Chi exercise for pain, stiffness, and physical function in patients with Osteoarthritis. A total of seven randomized controlled trials involving 348 patients with Osteoarthritis met the inclusion criteria. The study found that there was a statistically difference in the WOMAC Index in the Tai Chi group.

8. Conclusion

Our study concluded that Tai Chi exercises are effective for improving Balance in patients with Knee Osteoarthritis.

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