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ORIGINAL ARTICLE

EFFECTIVENESS OF AEROBIC EXERCISE WITH SHORTWAVE DIATHERMY VERSUS STRENGTHENING EXERCISE WITH SHORTWAVE DIATHERMY IN OSTEOARTHRITIS KNEE

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ABSTRACT

Background of the study: Osteoarthritis is one of the most common musculoskeletal disorders, characterized by progressive degeneration of the articular cartilage, resulting in loss of joint space. The objective of the study was to show the effectiveness of aerobic exercise with shortwave diathermy versus strengthening exercise with shortwave diathermy for people with OA. **Methodology:** It was an experimental study with pre and post comparative test type. The Study was conducted at physiotherapy OPD, ACS Hospital, Chennai. 30 subjects of both male and female with age group of 50 to 60 years with a clinical diagnosis of Osteoarthritis were randomly selected and equally divided into two groups. Group A received aerobic exercise with shortwave diathermy and Group B received strengthening exercise with shortwave diathermy for 3 sessions per week for 6 weeks. WOMAC, osteoarthritis index and sit to stand test were used as outcome measures. **Results:** Comparative study between Group A and Group B showed a significant difference in knee function with P value >0.0001. **Conclusion:** The study concluded that strengthening exercise with shortwave diathermy was more effective than aerobic exercise with shortwave diathermy on knee function among OA patients.

Keywords: OA Knee; Aerobic exercise walking; Strengthening exercise; Short Wave Diathermy; WOMACS; Osteoarthritis Index

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INTRODUCTION

One of the commonest forms of musculoskeletal disorder in the world affecting 2,693 and 1,770 of every 100,000 women and men is Knee osteoarthritis. Osteoarthritis is a articular cartilage degenerative disorder with activity of proinflammatory cytokines in the synovial regulation of macrophages and osteoclast. A progressive destruction of joint cartilage and narrowing of the joint space with hypertrophic changes is visible OA knee. OA is a whole joint disease with a multifactorial aetiology, including increased mechanical stress, ligament derangements, cartilage degradation, subchondral bone changes and muscular impairments¹⁻³.

OA occurs when the dynamic steady state between destructive forces and repair mechanisms destabilises the joint homeostasis. This imbalance is thought to be the driving force in this progressive disease and may produce pain and disability, although many patients with obvious radiographic findings don't complain of any symptoms related to OA knee. OA is most common in weight bearing joints such as the hips, knees and the ankle but it can occur in any synovial joint of the body^{4,5}.

Knee osteoarthritis is one of the predominant causes of the knee pain and most common type of knee arthritis, also called wear-and-tear arthritis or degenerative joint disease. Knee osteoarthritis is characterized by progressive wearing away of the knee joint cartilage thereby the cartilage is worn-out. Joint bone becomes exposed and knee gets swollen and painful, and corresponding activities becomes progressively painful. Generally, the older age people typically get affected with knee arthritis but the symptoms are more common with in

obese patients, and this patient's weight loss tends to reduce the pain severity associated with knee arthritis^{6,7}.

OA is commonly observed with middle and older age people, but it can prevail in any age groups, following a joint injury or another disorder. Onset of the knee osteoarthritis is usually slow and progressively worsen. Certain factors that increase risk of developing knee osteoarthritis are age, weight, injury or overuse, genetics. Several physical therapy interventions are available for OA through in-depth studies which show that capsaicin cream, laser treatment and transcutaneous electrical nerve stimulation [TENS] decrease the pain associated with OA⁸⁻¹⁰.

METHODOLOGY

It was an experimental study with pre and post comparative test type. The Study was conducted at physiotherapy OPD, ACS hospital, Chennai. 30 subjects of both male and female with age group of above 50 years with a clinical diagnosis of Osteoarthritis were randomly selected and equally divided into two groups. Group A received aerobic exercise with shortwave diathermy and Group B received strengthening exercise with shortwave diathermy 3 sessions per week for 6 weeks. Secondary knee osteoarthritis [traumatic or postsurgical] rheumatoid arthritis septic arthritis Paget's disease was excluded in this study. Materials used in this study were chair, scale, pen, paper.

Outcome measures: Knee function was measured using WOMAC osteoarthritis index and sit to stand test.

Procedure: A total of 30 subjects were selected and divided into 2 groups based on inclusion and exclusion criteria with age group of above 50 years. Group A received aerobic exercise with shortwave diathermy and Group B received strengthening exercise with shortwave diathermy for per 6 weeks.

Group A: Received Aerobic exercise training for both upper and lower extremities. Warm up gradually for 5 to 10 minutes. Included stretching and repetitive motions at slow speeds. Gradually increasing the effort. Cool down for 5 to 10 minutes with slow total body repetitive motion and stretching activities. The aerobic activity were given 3 sessions per week totally for 6 weeks. To avoid injuries from stress use appropriate equipment and such as correct foot wear, for proper biomechanical support avoid running, jogging and aerobic

dancing on hot surface such as asphalt and concrete. Individualize the program of exercise all people are not at the same fitness level and therefore cannot perform the same exercise. Group A also received shortwave diathermy for 10 mins using contra planar method. The placement of electrodes were on medial and lateral side.

Group B: Received strengthening exercise which included Seated knee extension, Straight leg raise, Side leg raise, Pillow squeeze, pelvic bridging 3 sessions per week for 6 weeks. Group B also received shortwave diathermy for 10 mins using contra planar method. The placement of electrodes was on medial and lateral side.

Data Analysis

#WOMAC	#GROUP - A		#GROUP - B		t - TEST	df	SIGNIFICANCE
	MEAN	S.D	MEAN	S.D			
PRE TEST	47.20	1.42	47.06	2.05	.207	28	.838*
POST TEST	33.33	1.44	28.93	2.98	5.13	28	.000***

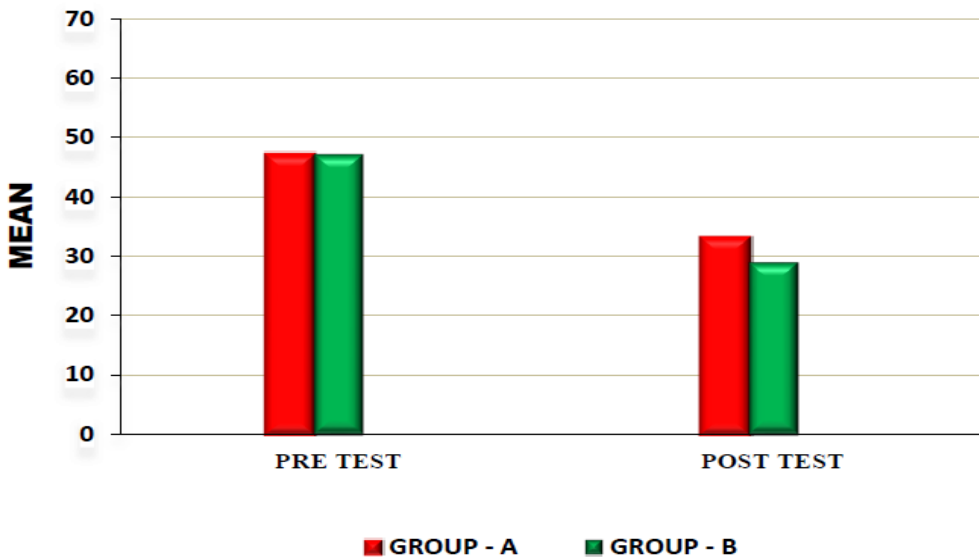
(* - P > 0.05), (***) - P ≤ 0.001)

Table 1: Comparison of WOMAC Score between Group - A and Group - B

The above table reveals the Mean, Standard Deviation (S.D), t-test, degree of freedom(df) and p-value between (Group A) & (Group B) in pre test and post test weeks.

This table shows that there is no significant difference in pre test values between Group A & Group B (*P > 0.05).

This table shows that statistically significant difference in post test values between Group A & Group B (***) - P ≤ 0.001)



Graph 1: Comparison of WOMAC score between Group A and Group B

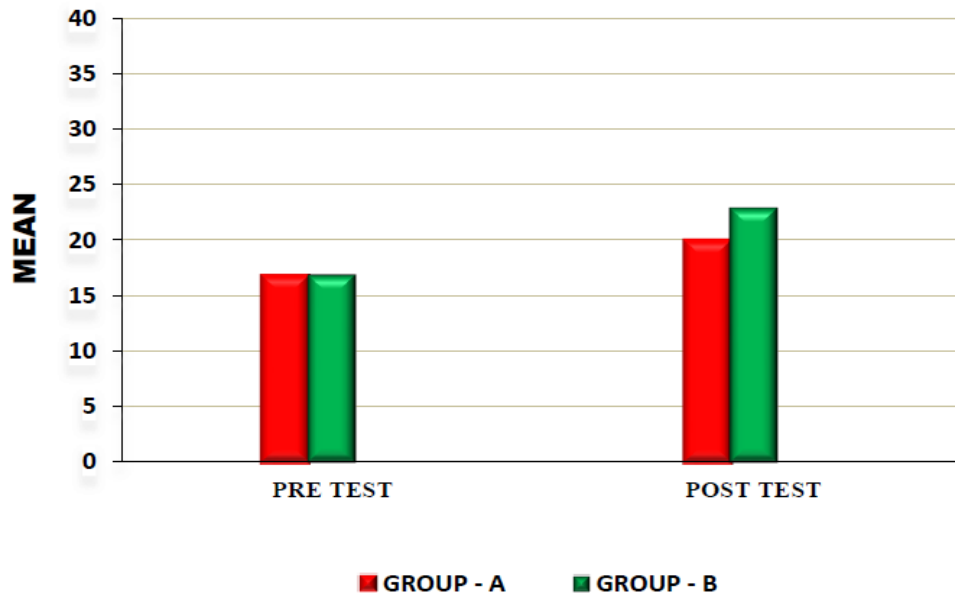
#STS	#GROUP - A		#GROUP - B		t - TEST	df	SIGNIFICANCE
	MEAN	S.D	MEAN	S.D			
PRE TEST	16.80	1.78	16.86	1.35	-.115	28	.909*
POST TEST	19.93	1.90	22.86	1.45	-4.73	28	.000***

(* - $P > 0.05$), (** - $P \leq 0.001$)

Table-2: Comparison of sit to stand test score between Group A and Group -B in pre and post test

The above table reveals the Mean, Standard Deviation (S.D), t-test, degree of freedom(df) and p-value between (Group A) & (Group B) in pre test and post test weeks. This table shows that there is no significant difference in pre test

values between Group A & Group B ($*P > 0.05$). This table shows that statistically significant difference in post test values between Group A& Group B ($*** - P \leq 0.001$).



Graph 2: Comparison of sit to stand test score between Group A and Group -B in pre and post test

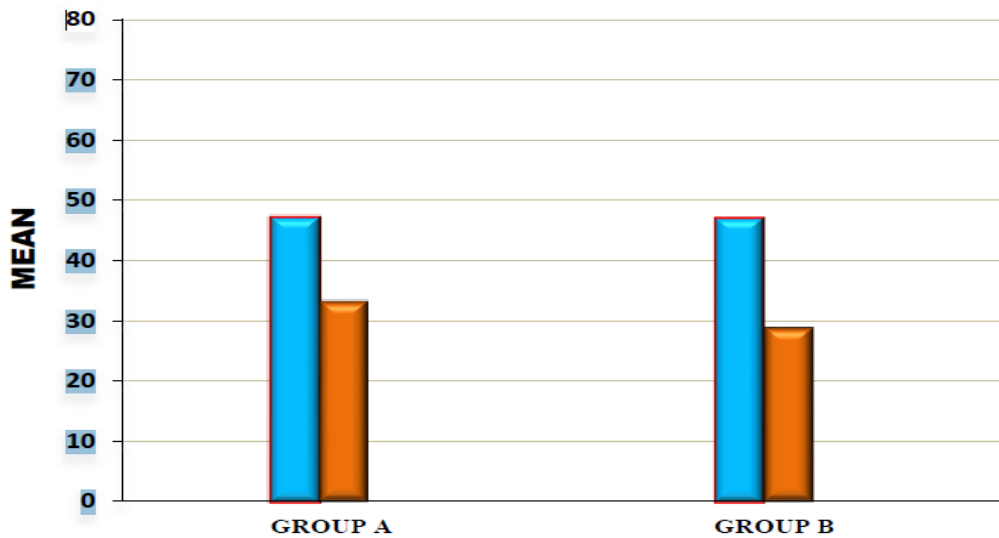
#WOMAC	PRE TEST		POST TEST		t - TEST	SIGNIFICANCE
	MEAN	S.D	MEAN	S.D		
GROUP- A	47.20	1.42	33.33	1.44	47.71	.000 ^{***}
GROUP- B	47.06	2.05	28.93	2.98	23.62	.000 ^{***}

(***- P ≤ 0.001)

Table 3: Comparison of WOMAC score between Group A and Group B in pre and post test

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group A & Group

B. There is a statistically significant difference between the pre test and post test values within Group A and Group B (***- P ≤ 0.001).



Graph 3: Comparison of WOMAC score within Group A & Group B between Pre & Post Test Values

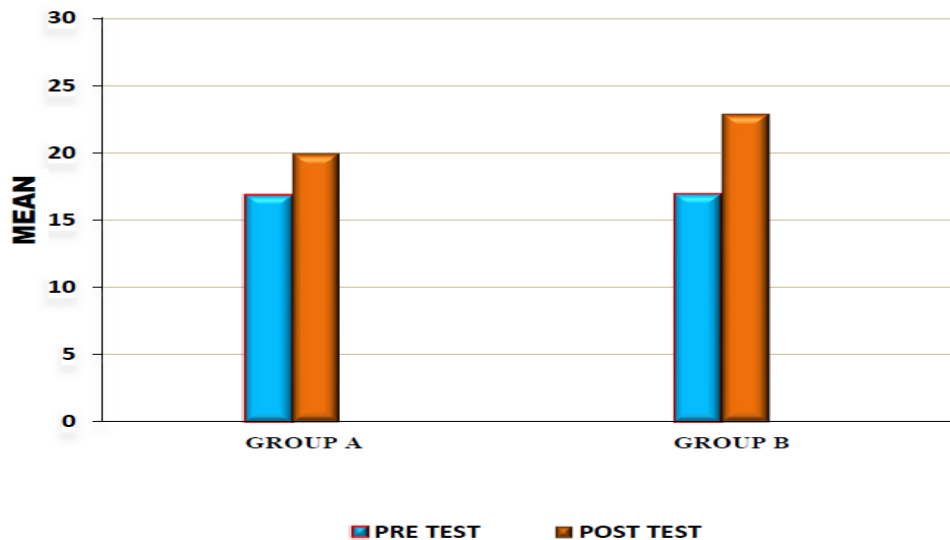
#STS	PRE TEST		POST TEST		t - TEST	SIGNIFICANCE
	MEAN	S.D	MEAN	S.D		
GROUP- A	16.80	1.78	19.93	1.90	-6.31	.000 ^{***}
GROUP- B	16.86	1.35	22.80	1.45	-17.74	.000 ^{***}

(***- P ≤ 0.001)

Table 4: Comparison of sit to stand test score within Group A & Group B between pre & post test values

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group A & Group B. There is a statistically highly significant

difference between the pre test and post test values within Group A and Group B (***- P ≤ 0.001).



Graph 4: Comparison of sit to stand test score within Group- A & Group- B between pre & post test values

RESULT

On comparing the Mean values of Group A & Group B on WOMAC osteoarthritis index Score, it shows significant decrease in the post test mean values in both groups, but Group B; performed strengthening exercise with Shortwave diathermy shows 28.93 which has the lower mean value, which is effective than Group A; performed Aerobic exercise with Shortwave diathermy 33.33 at $P \leq 0.001$.

On comparing the mean values of Group A & Group B on Sit to stand score, it shows significant increase in the post test mean in both groups, but Group B; Strengthening exercise with Shortwave diathermy shows 22.86 which has the higher mean value is effective than Group A - Aerobic exercise with Shortwave diathermy of 19.93 at $P \leq 0.001$. On comparing Pre test and Post test within Group A & Group B on WOMAC osteoarthritis index and sit to stand test shows significant difference in mean values at $P \leq 0.001$.

DISCUSSION

Thirty subjects were grouped into Group A [15] received aerobic exercise with shortwave diathermy and Group B [15] received strengthening exercise with shortwave diathermy. Both male and female are included. The treatment duration was 6 weeks and the outcome measure done by using WOMAC osteoarthritis index score, sit to stand test.

At the end of the treatment programme both the group showed improvement. When compared strengthening exercise with shortwave diathermy seem to be more effective than aerobic exercise with shortwave diathermy.

Statistical analysis revealed that there was a significant difference $P < 0.001$ between the groups and proved the strengthening exercise with shortwave diathermy was more effective than aerobic exercise with shortwave diathermy in the treatment program which is supported by previous studies shows that

comparing a leg functional aerobic and strengthening exercise yields functional benefits for patient with osteoarthritis of the knee¹¹⁻¹³.

Another study shows that significant effects of individual and group supervised aerobic and strengthening exercise programs. Strength training exercise improved muscle strength and self-reported measures of pain and physical function has reported in different studies¹⁴⁻¹⁶.

Each group had equal number of participants and showed significant difference in mean value of post-test. The mean value of Group A and Group B in pre-test 47.20 and 47.06. The mean value of Group A and Group B in post-test 33.33 and 28.93 on WOMAC score between Group A and Group B. The mean value of Group A and Group B in pre-test 16.80 and 16.86. The mean value of Group A and Group B in post-test 19.93 and 22.86 on sit to stand test score between Group A and Group B. The mean value of Group A and Group B in pre-test 47.20 and 47.06. The mean value of Group A and Group B in post-test 33.33 and 28.93 on WOMAC score within Group A and Group B between pre and post-test value.

The mean value of Group A and Group B in pre-test 16.80 and 16.86. The mean value of Group A and Group B in post-test 19.93 and 22.80 on sit to stand test score in Group A and Group B between pre and post-test values. These values clearly indicate that there was statistically significant improvement in strengthening exercise with shortwave diathermy. The result shows that strengthening exercise with shortwave diathermy more effective than aerobic exercise with shortwave diathermy.

Ethical Clearance: Ethical clearance has obtained from Faculty of Physiotherapy,

DR.MGR. Educational and Research Institute, Chennai to conduct this study with reference number: B-12/ PHSIO/IRB/2019-20 dated 07/01/2020.

Conflict of interest: The author reported no conflict of interest to conduct and publish this article.

Funding: The researchers had self financial support to conduct this research.

CONCLUSION

The present study concluded that the strengthening exercise with shortwave diathermy is beneficial in improving physical function and good range motion in osteoarthritis knee. The is significant difference between pre and post-test after the 6 weeks treatment programme Group B; strengthening exercise with shortwave diathermy shows a significant improvement when compared to Group A; Aerobic exercise with shortwave diathermy.

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